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Kim et al.

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(45) **Date of Patent: Oct. 18, 2016**

(54) **METHOD AND DEVICE FOR DELIVERING MESSAGES**

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(73) Assignee: **LG ELECTRONICS INC.**, Seoul (KR)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 162 days.

(21) Appl. No.: **14/129,863**

(22) PCT Filed: **May 30, 2012**

(86) PCT No.: **PCT/KR2012/004235**

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(2), (4) Date: **Dec. 27, 2013**

(87) PCT Pub. No.: **WO2013/002493**

PCT Pub. Date: **Jan. 3, 2013**

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Related U.S. Application Data

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(30) **Foreign Application Priority Data**

Apr. 24, 2012 (KR) 10-2012-0042824

(51) **Int. Cl.**
H04W 4/14 (2009.01)
H04L 29/06 (2006.01)
H04W 76/02 (2009.01)

(52) **U.S. Cl.**
CPC ***H04W 4/14*** (2013.01); ***H04L 65/1006*** (2013.01); ***H04L 65/1016*** (2013.01); ***H04L 65/1073*** (2013.01); ***H04W 76/021*** (2013.01)

(58) **Field of Classification Search**
CPC . H04L 12/063; H04L 12/2834; H04L 12/58; H04L 12/581; H04L 12/5835; H04L 12/5895; H04L 12/589; H04L 12/66; H04L 51/066; H04L 51/36; H04L 51/04; H04L 65/1016; H04L 69/08; H04W 4/18; H04W 4/14; H04W 4/12; H04W 88/184
See application file for complete search history.

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(Continued)

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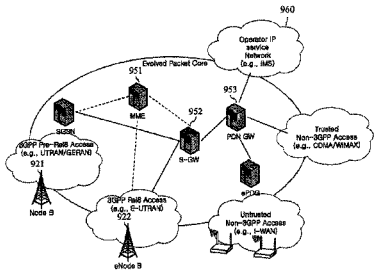
(57) **ABSTRACT**

A method for interworking messages of heterogeneous, and which includes acquiring a temporary identifier of the sending terminal when the sending terminal is a terminal that subscribes in an IP multimedia subsystem (IMS) without a mobile communication global unique number, in which the temporary identifier is an identifier used for transmitting a short message during an IMS registration valid period of the sending terminal; receiving a session initiation protocol (SIP) based message transmitted by the sending terminal from an IMS based session controller; acquiring a temporary identifier of a receiving terminal based on an SIP based identifier of the receiving terminal encapsulated in the SIP based message; and generating a short message service (SMS) based message based on the received SIP based message, the temporary identifier of the receiving terminal, and the temporary identifier of the transmitting terminal.

10 Claims, 18 Drawing Sheets



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SA WG2 Meeting #88 S2-114816, Key Issue: How to carry MSISDN-less IMS UE SIP URI in SMSIP Origination, Nov. 14-18, 2011, 3GPP.*

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FIG. 1

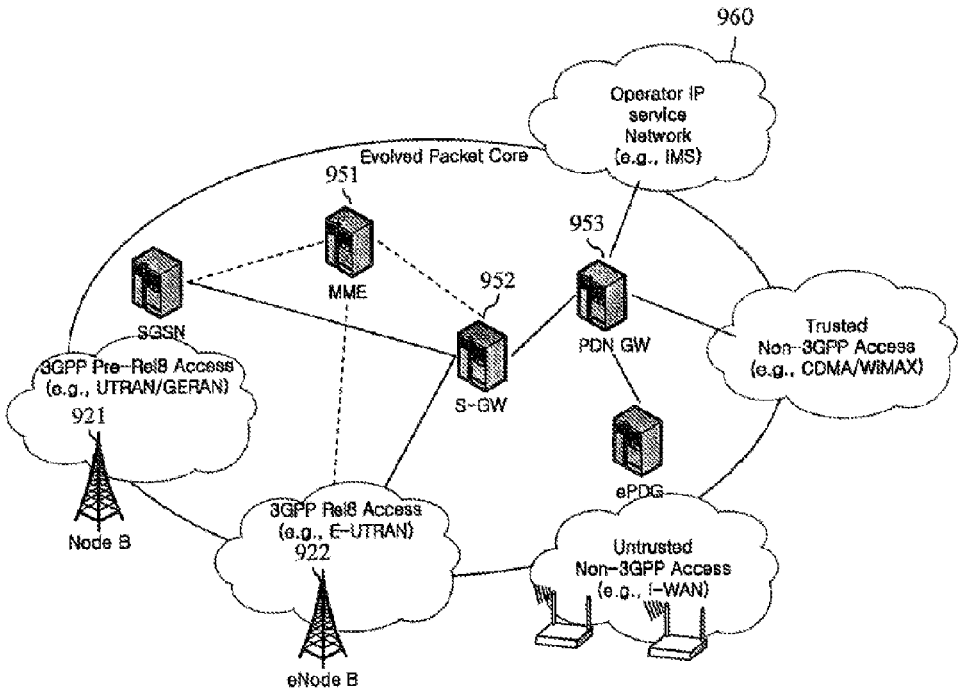

960
Operator IP service Network (e.g., IMS)
Evolved Packet Core
951
953
MME
952
SGSN
PDN GW
Trusted Non-3GPP Access (e.g., CDMA/WiMAX)
3GPP Pre-Rel8 Access (e.g., UTRAN/GERAN)
921
S-GW
ePDG
3GPP Rel8 Access (e.g., E-UTRAN)
922
Untrusted Non-3GPP Access (e.g., I-WAN)
Node B
eNode B

FIG. 2

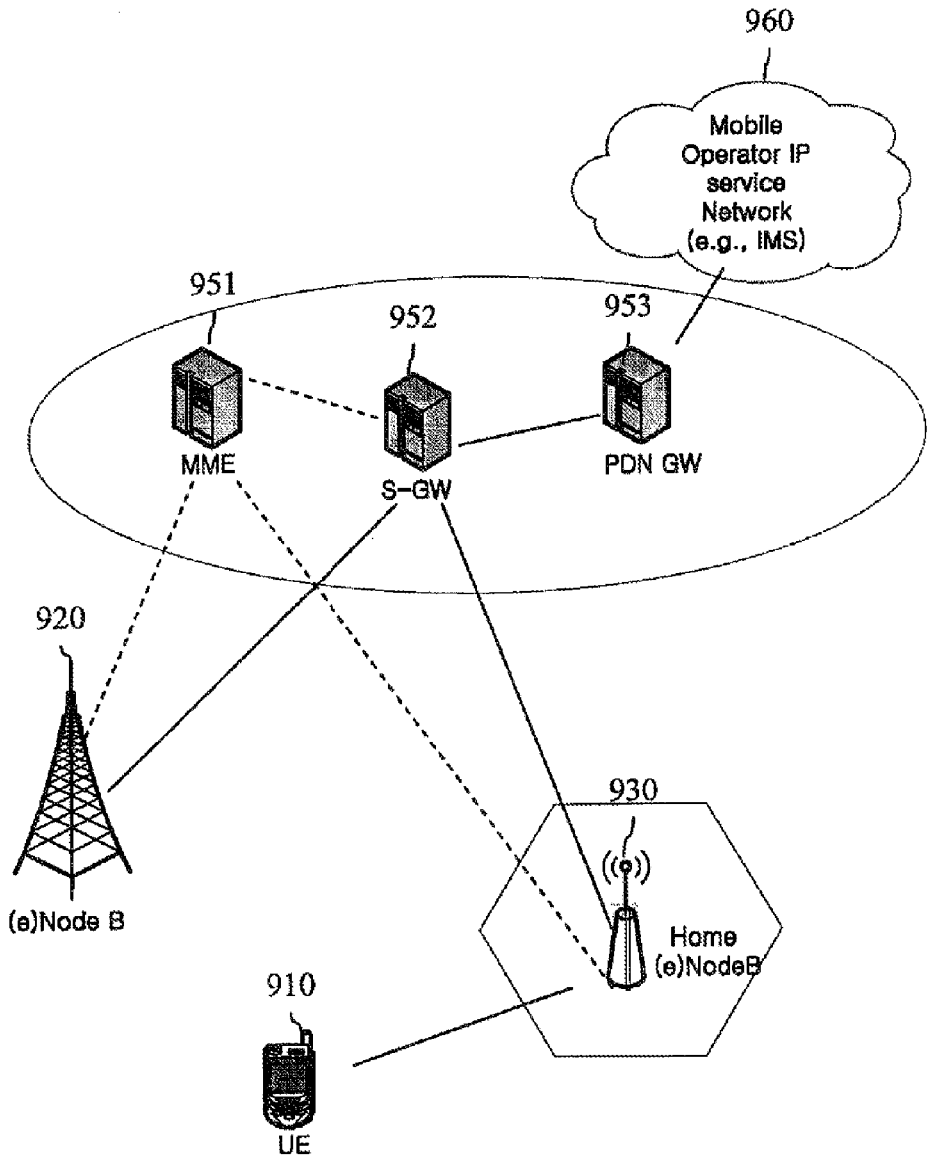

960
Mobile Operator IP service Network (e.g., IMS)
951
952
953
MME
S-GW
PDN GW
920
(e)Node B
930
Home (e)NodeB
910
UE

FIG. 3

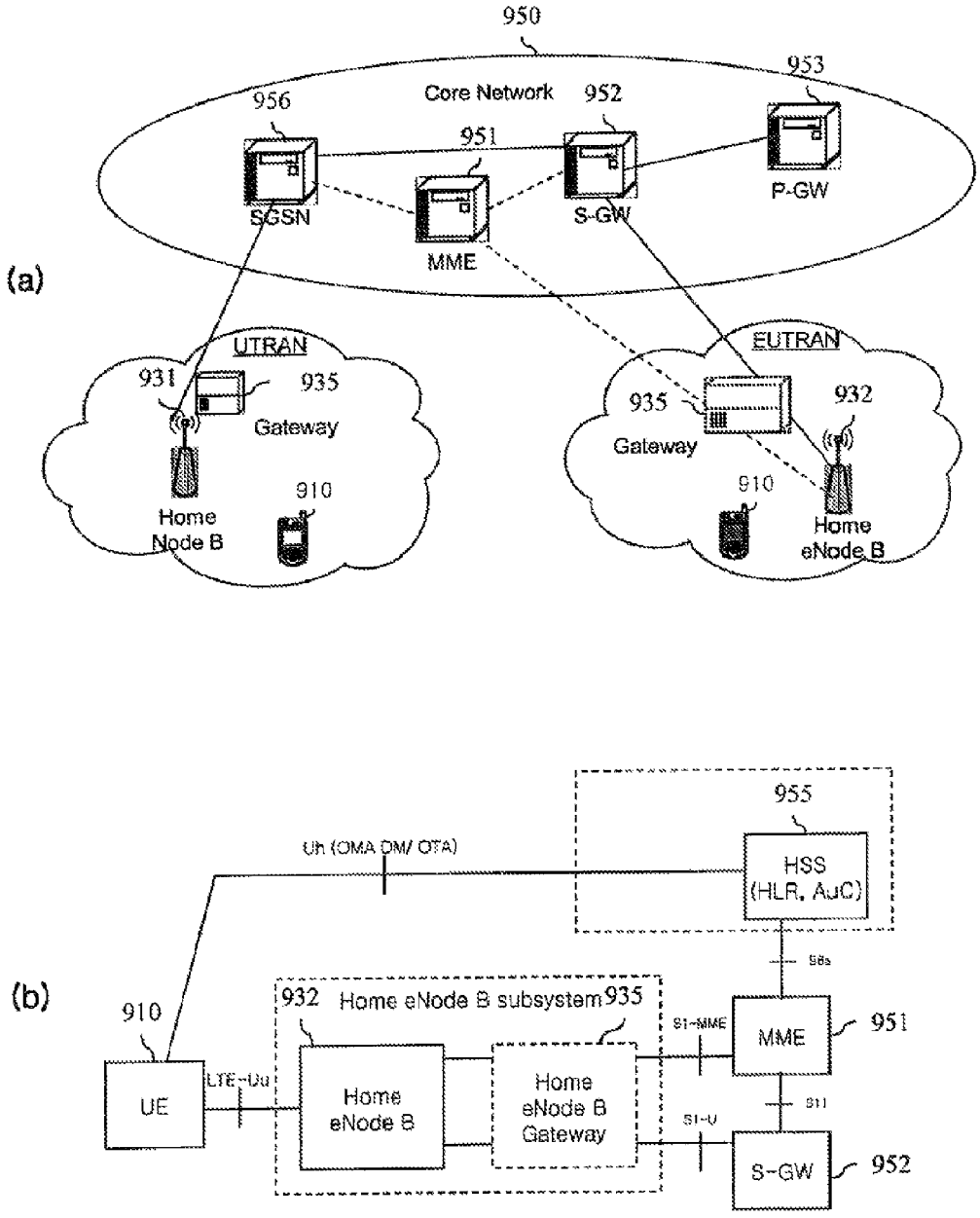

(a)
950
Core Network
952
953
956
951
SGSN
MME
S-GW
P-GW
UTRAN
931
935
Gateway
910
Home
Node B
EUTRAN
935
932
Gateway
910
Home
eNode B
(b)
955
Uh (OMA DM/ OTA)
HSS
(HLR, AuC)
S6a
910
932
Home eNode B subsystem
935
S1-MME
MME
951
UE
LTE-Uu
Home
eNode B
Home
eNode B
Gateway
S11
S1-U
S-GW
952

FIG. 4

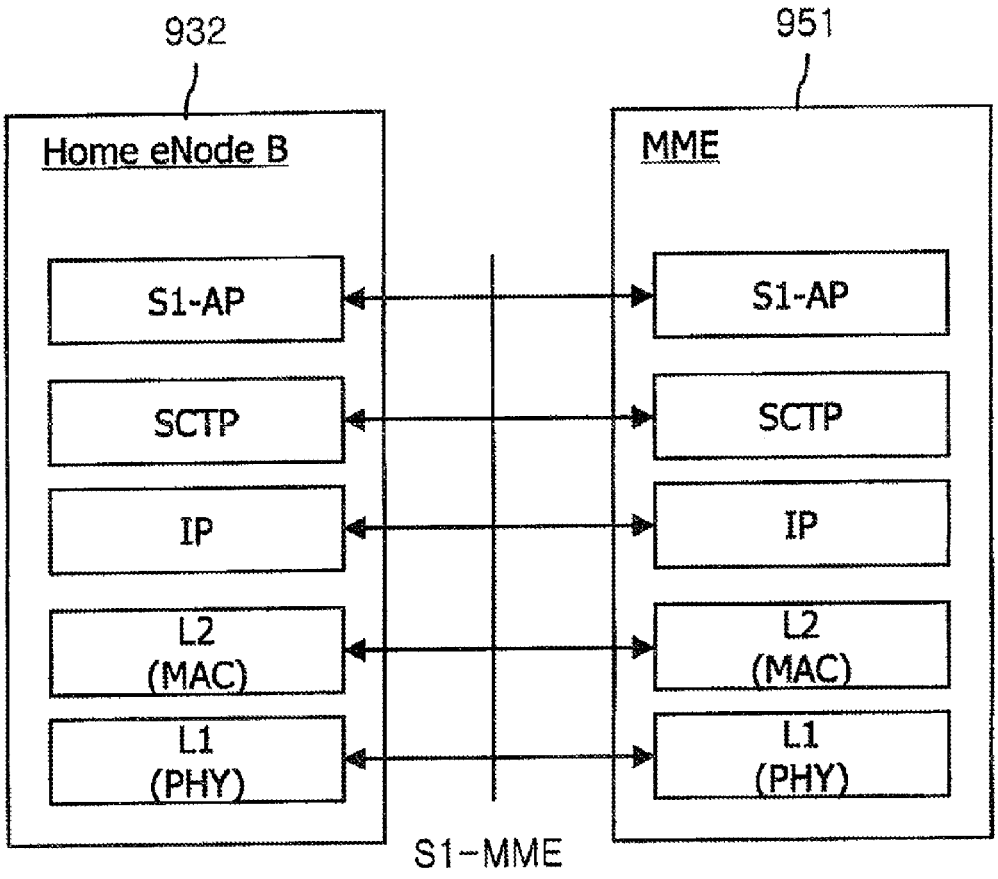

932
951
Home eNode B
MME
S1-AP
S1-AP
SCTP
SCTP
IP
IP
L2
(MAC)
L2
(MAC)
L1
(PHY)
L1
(PHY)
S1-MME

FIG. 5A

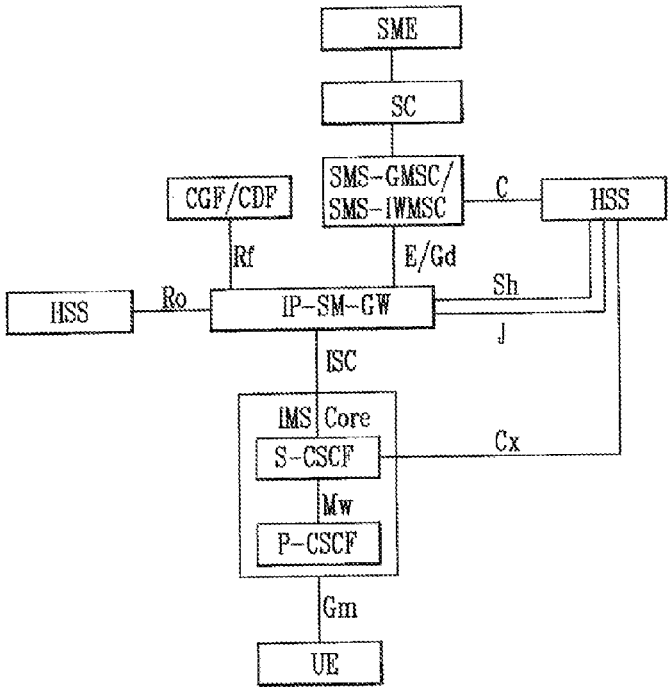

SME
SC
SMS-GMSC/
SMS-IWMSC
C
HSS
CGF/CDF
Rf
E/Gd
Sh
HSS
Ro
IP-SM-GW
J
ISC
IMS Core
S-CSCF
Cx
Mw
P-CSCF
Gm
UE

FIG. 5B

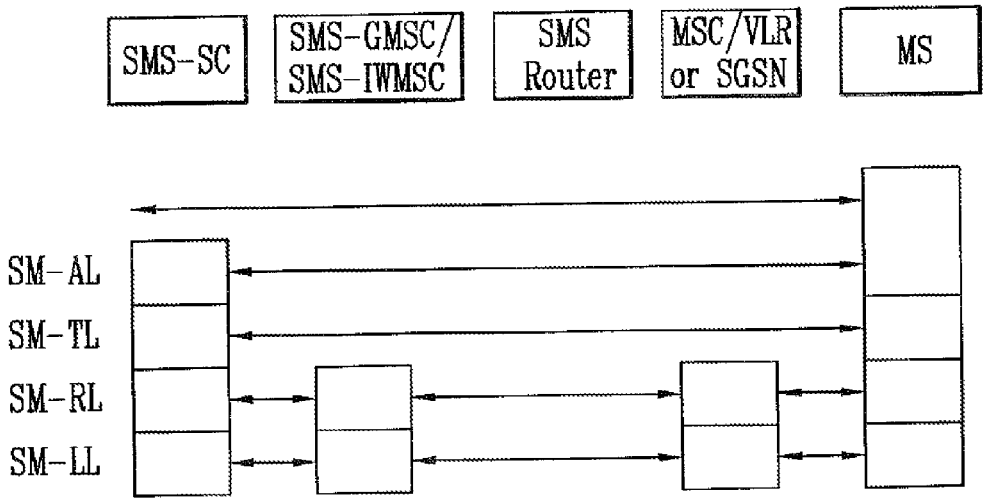

SMS-SC
SMS-GMSC/
SMS-IWMSC
SMS
Router
MSC/VLR
or SGSN
MS
SM-AL
SM-TL
SM-RL
SM-LL

FIG. 6

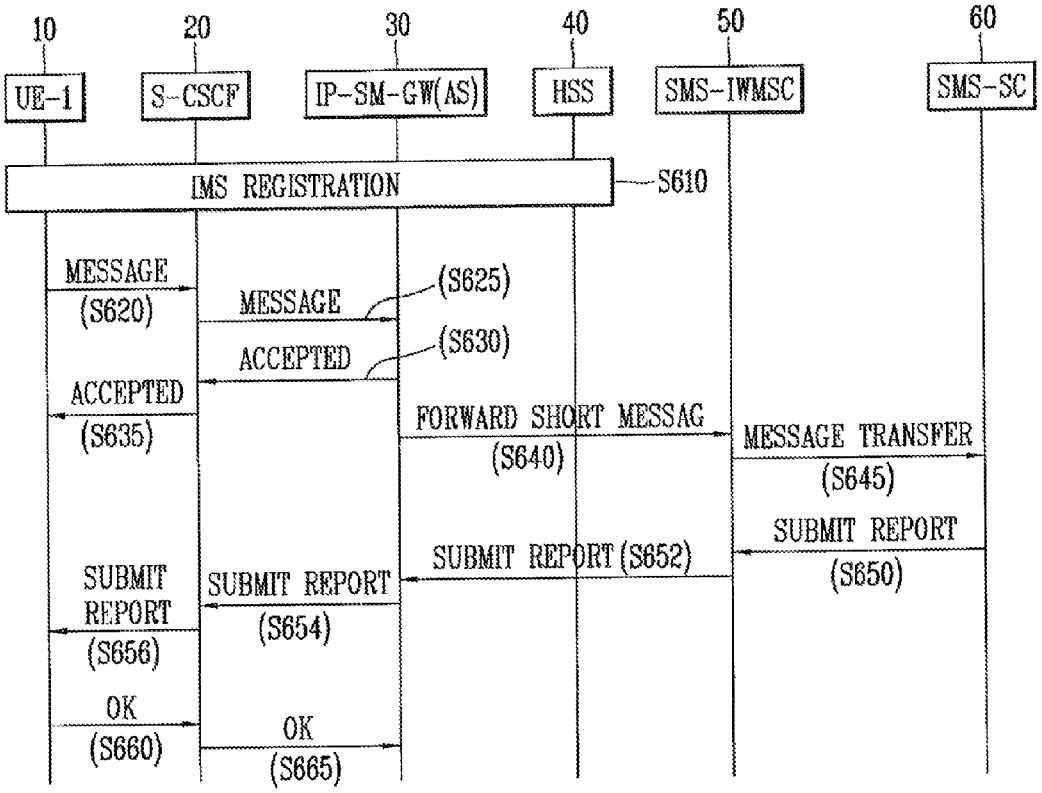

10
20
30
40
50
60
UE-1
S-CSCF
IP-SM-GW(AS)
HSS
SMS-IWMSC
SMS-SC
IMS REGISTRATION
S610
MESSAGE
(S620)
MESSAGE
(S625)
ACCEPTED
(S630)
ACCEPTED
(S635)
FORWARD SHORT MESSAG
(S640)
MESSAGE TRANSFER
(S645)
SUBMIT REPORT
(S650)
SUBMIT REPORT (S652)
SUBMIT REPORT
(S654)
SUBMIT REPORT
(S656)
OK
(S660)
OK
(S665)

FIG. 7

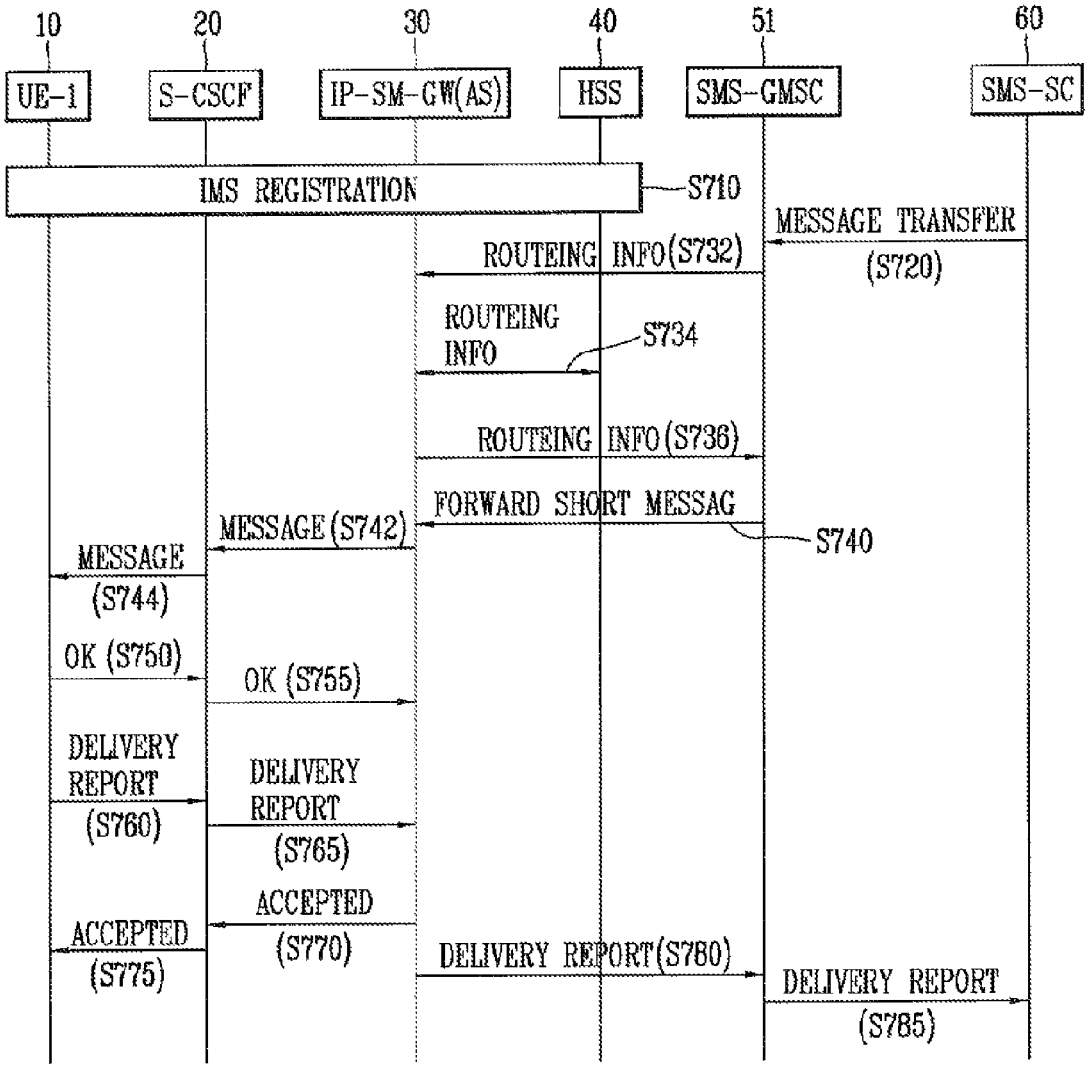

10
20
30
40
51
60
UE-1
S-CSCF
IP-SM-GW(AS)
HSS
SMS-GMSC
SMS-SC
IMS REGISTRATION
S710
MESSAGE TRANSFER
(S720)
ROUTEING INFO(S732)
ROUTEING INFO
S734
ROUTEING INFO(S736)
FORWARD SHORT MESSAG
S740
MESSAGE(S742)
MESSAGE
(S744)
OK (S750)
OK (S755)
DELIVERY REPORT
(S760)
DELIVERY REPORT
(S765)
ACCEPTED
(S770)
ACCEPTED
(S775)
DELIVERY REPORT(S780)
DELIVERY REPORT
(S785)

FIG. 8

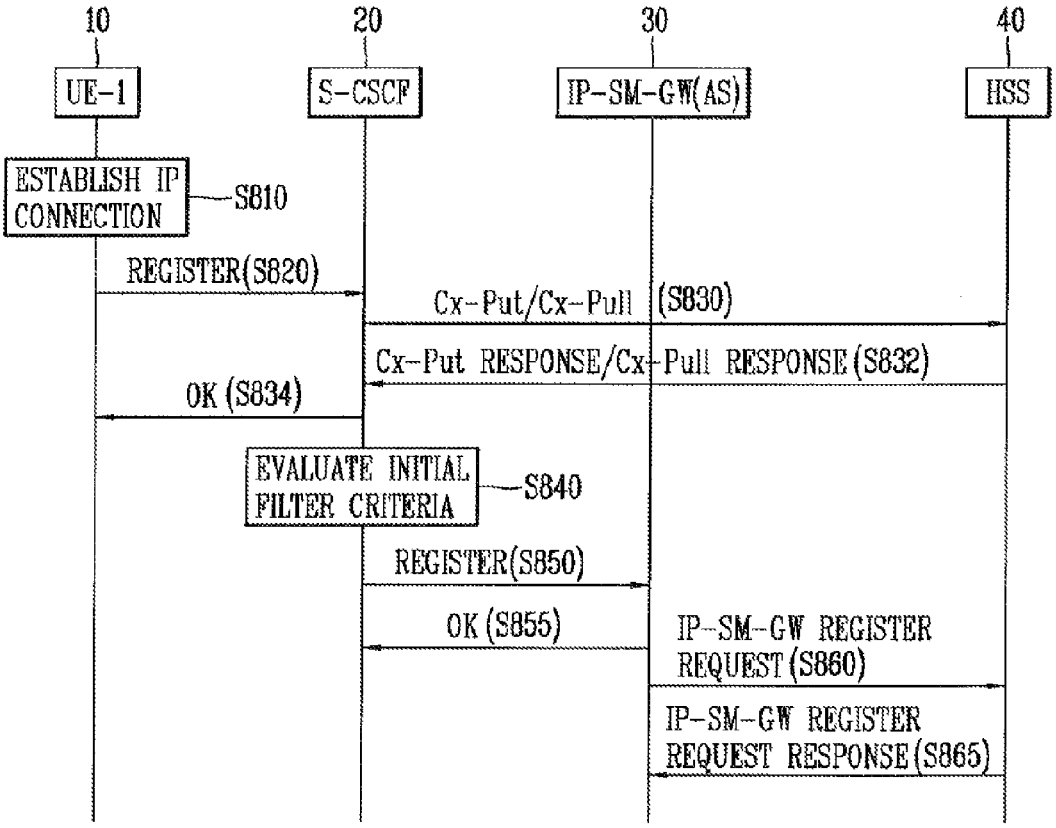

10
20
30
40
UE-1
S-CSCF
IP-SM-GW(AS)
HSS
ESTABLISH IP CONNECTION
S810
REGISTER(S820)
Cx-Put/Cx-Pull (S830)
Cx-Put RESPONSE/Cx-Pull RESPONSE(S832)
OK(S834)
EVALUATE INITIAL FILTER CRITERIA
S840
REGISTER(S850)
OK(S855)
IP-SM-GW REGISTER REQUEST(S860)
IP-SM-GW REGISTER REQUEST RESPONSE(S865)

FIG. 9

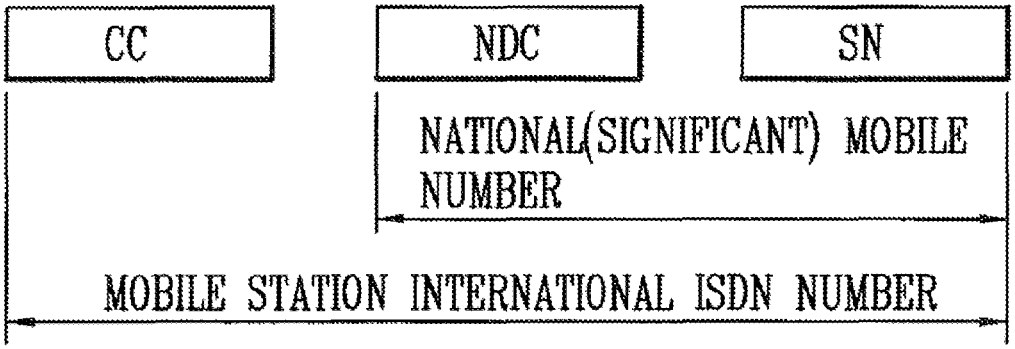

CC
NDC
SN
NATIONAL(SIGNIFICANT) MOBILE NUMBER
MOBILE STATION INTERNATIONAL ISDN NUMBER

FIG. 10

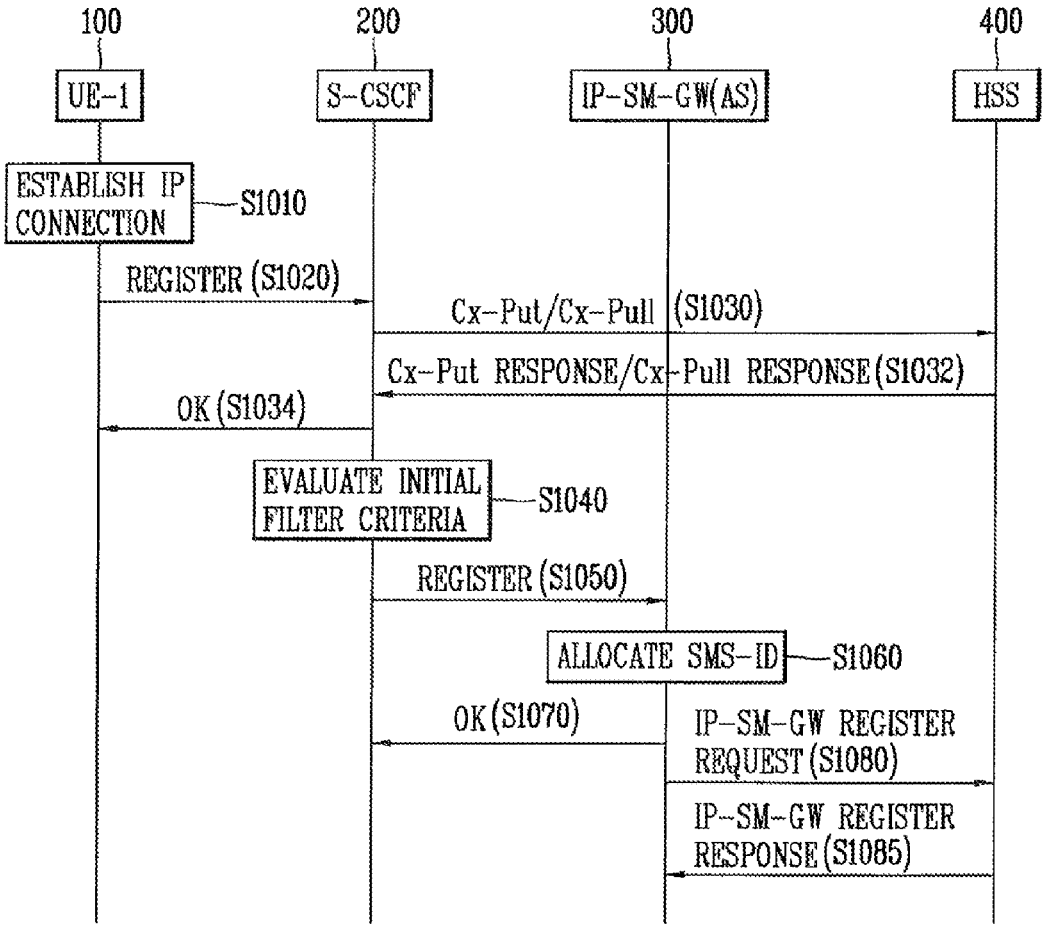

100
200
300
400
UE-1
S-CSCF
IP-SM-GW(AS)
HSS
ESTABLISH IP CONNECTION
S1010
REGISTER (S1020)
Cx-Put/Cx-Pull (S1030)
Cx-Put RESPONSE/Cx-Pull RESPONSE (S1032)
OK (S1034)
EVALUATE INITIAL FILTER CRITERIA
S1040
REGISTER (S1050)
ALLOCATE SMS-ID
S1060
OK (S1070)
IP-SM-GW REGISTER REQUEST (S1080)
IP-SM-GW REGISTER RESPONSE (S1085)

FIG. 11

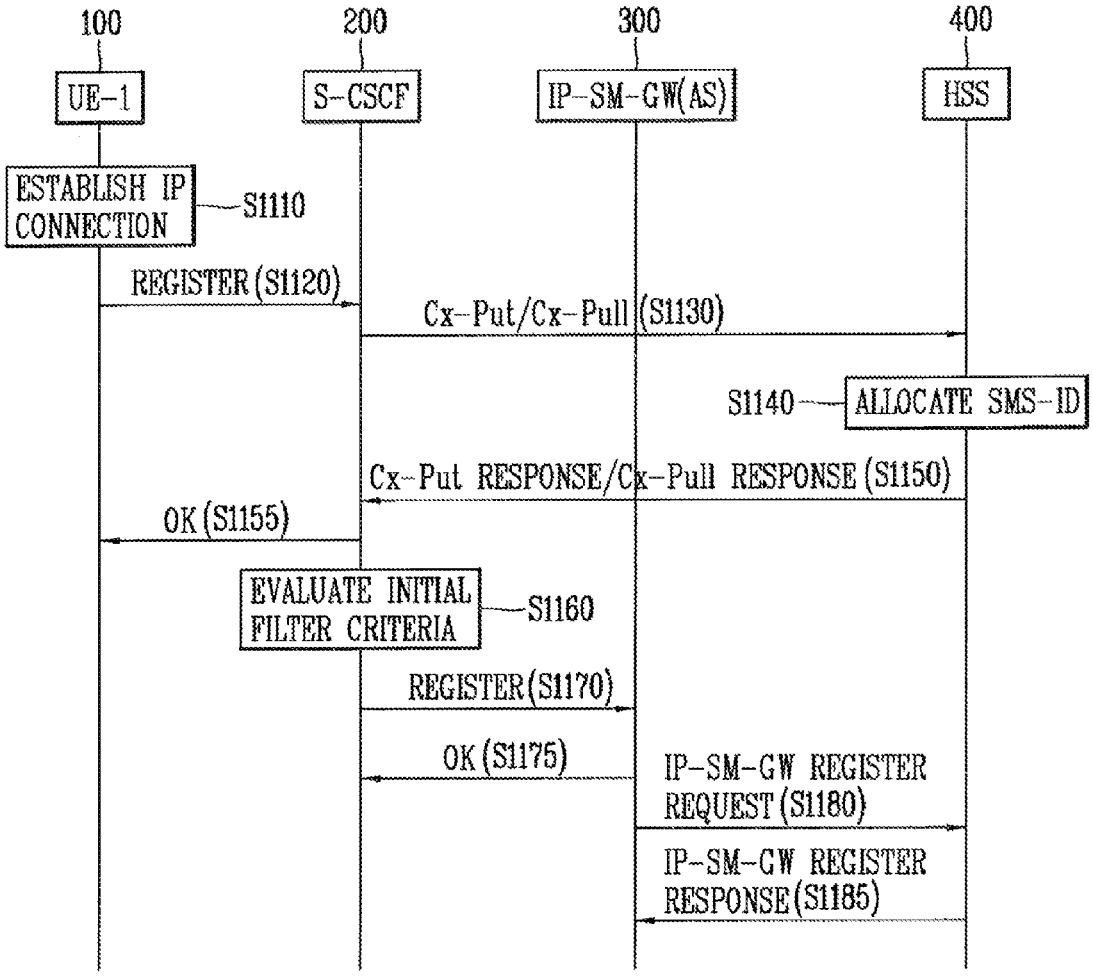

100
200
300
400
UE-1
S-CSCF
IP-SM-GW(AS)
HSS
ESTABLISH IP CONNECTION
S1110
REGISTER(S1120)
Cx-Put/Cx-Pull(S1130)
S1140
ALLOCATE SMS-ID
Cx-Put RESPONSE/Cx-Pull RESPONSE(S1150)
OK(S1155)
EVALUATE INITIAL FILTER CRITERIA
S1160
REGISTER(S1170)
OK(S1175)
IP-SM-GW REGISTER REQUEST(S1180)
IP-SM-GW REGISTER RESPONSE(S1185)

FIG. 12

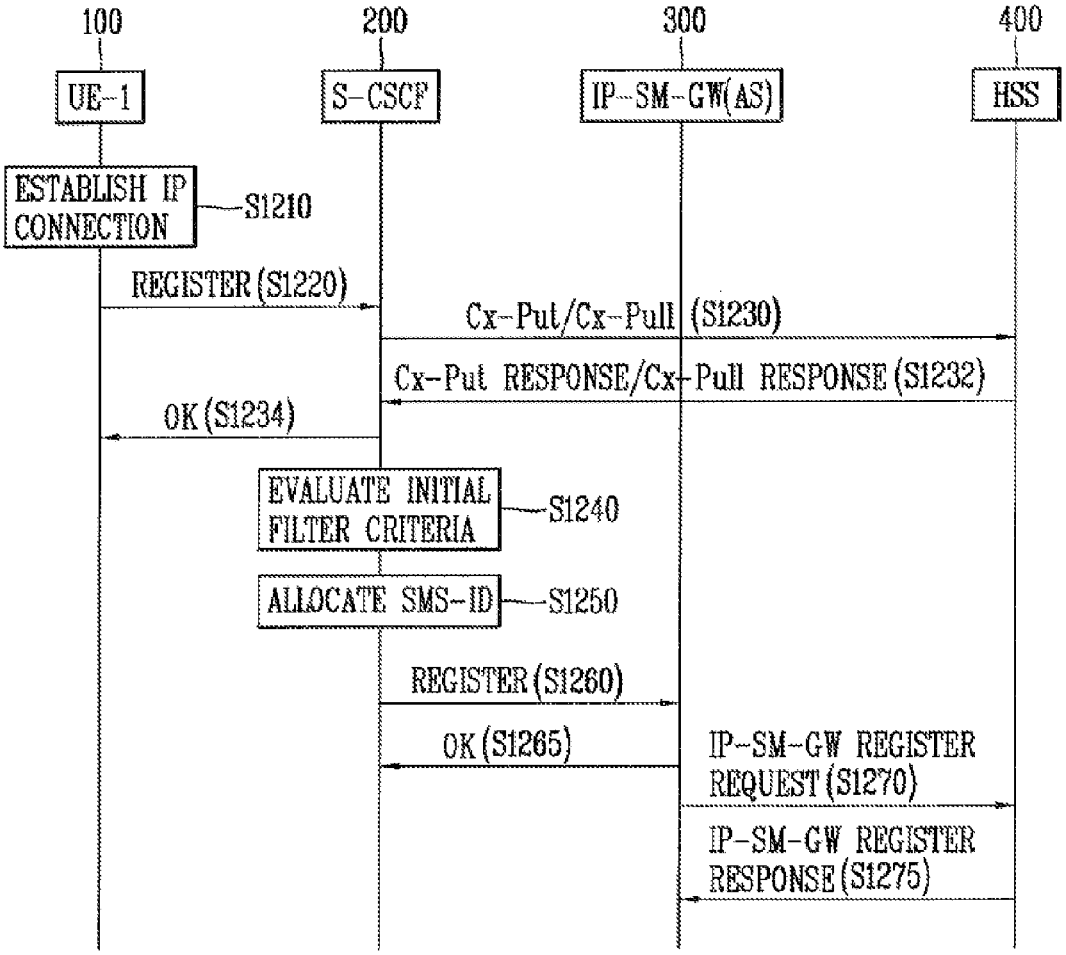

100
200
300
400
UE-1
S-CSCF
IP-SM-GW(AS)
HSS
ESTABLISH IP CONNECTION
S1210
REGISTER(S1220)
Cx-Put/Cx-Pull (S1230)
Cx-Put RESPONSE/Cx-Pull RESPONSE(S1232)
OK(S1234)
EVALUATE INITIAL FILTER CRITERIA
S1240
ALLOCATE SMS-ID
S1250
REGISTER(S1260)
OK(S1265)
IP-SM-GW REGISTER REQUEST(S1270)
IP-SM-GW REGISTER RESPONSE(S1275)

FIG. 13A

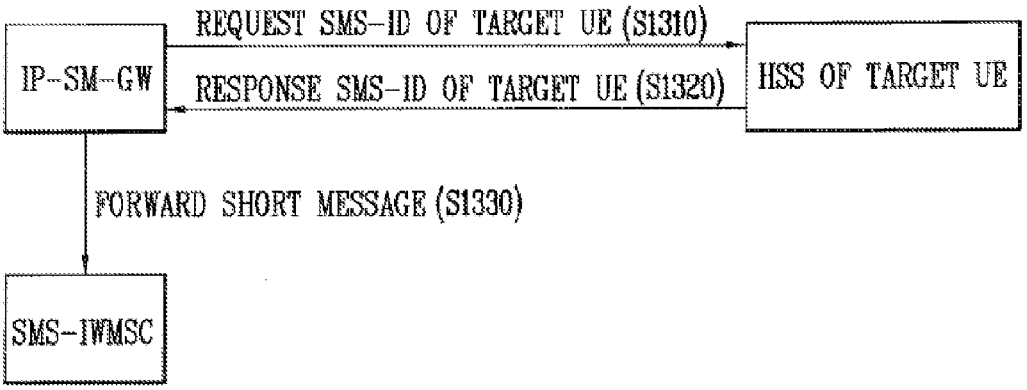


FIG. 13B

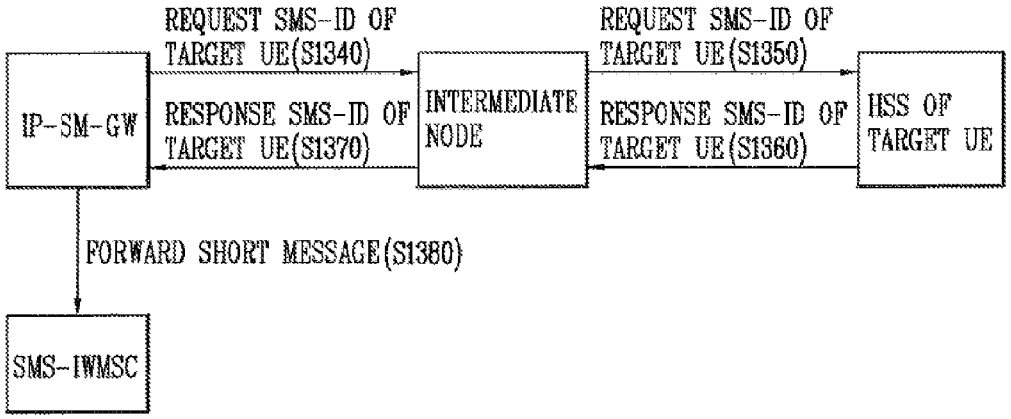


FIG. 14

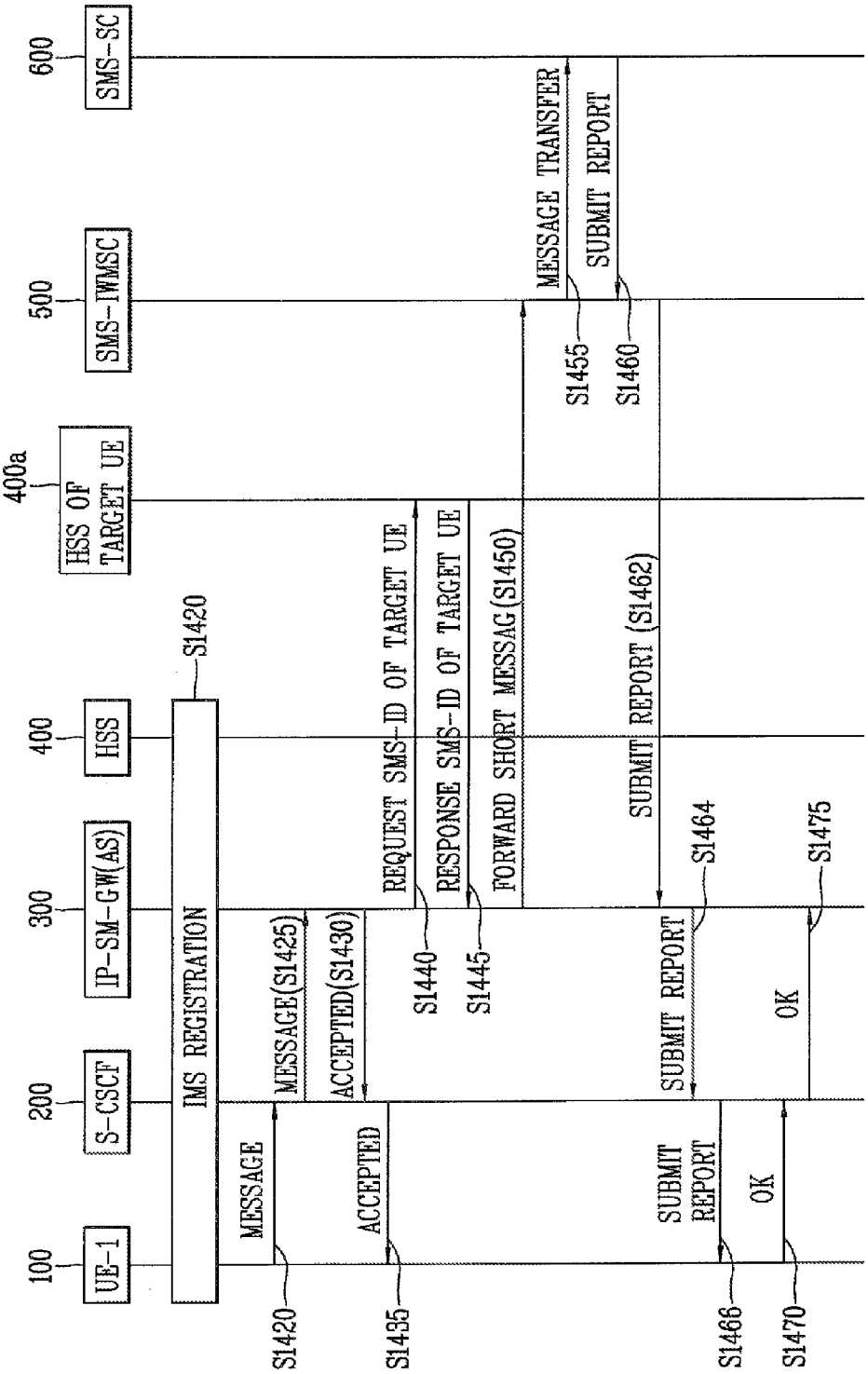

100
UE-1
200
S-CSCF
300
IP-SM-GW(AS)
400
HSS
400a
HSS OF TARGET UE
500
SMS-IWMSC
600
SMS-SC
S1420
IMS REGISTRATION
MESSAGE
S1420
MESSAGE(S1425)
ACCEPTED(S1430)
ACCEPTED
S1435
REQUEST SMS-ID OF TARGET UE
S1440
RESPONSE SMS-ID OF TARGET UE
S1445
FORWARD SHORT MESSAG(S1450)
MESSAGE TRANSFER
S1455
SUBMIT REPORT
S1460
SUBMIT REPORT (S1462)
S1464
SUBMIT REPORT
S1466
OK
S1470
OK
S1475

FIG. 15A

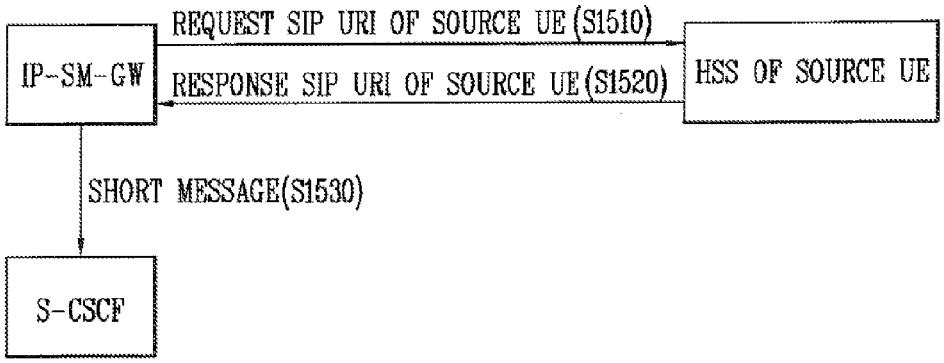


FIG. 15B

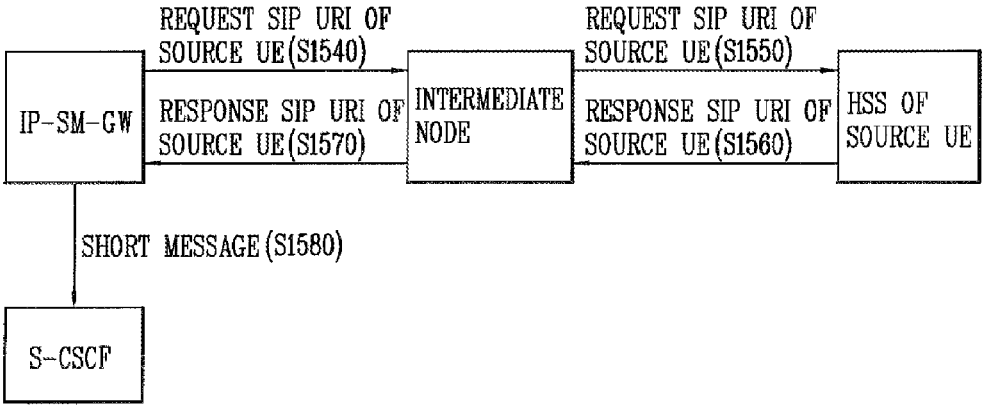


FIG. 16

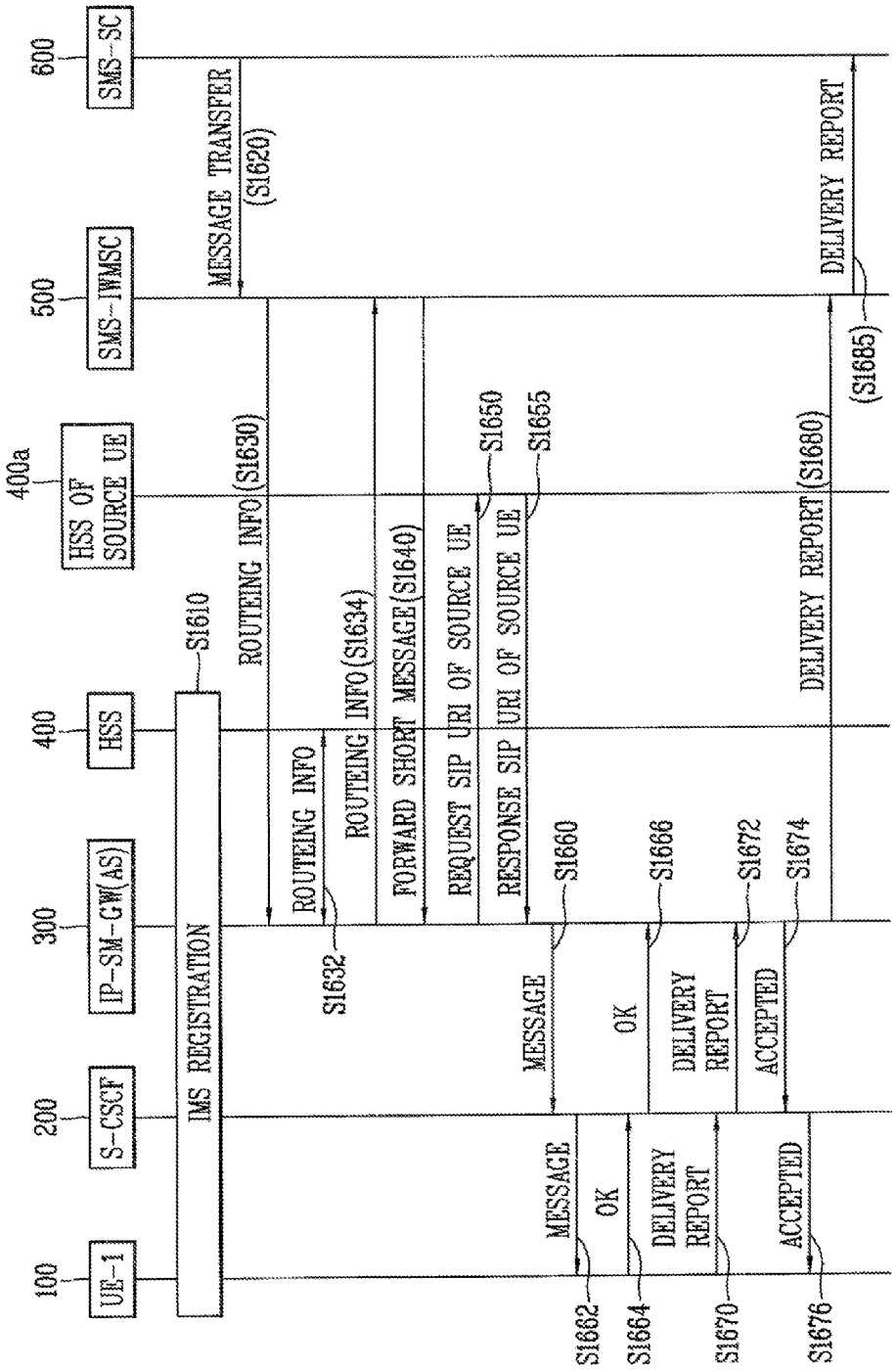

100
UE-1
200
S-CSCF
300
IP-SM-GW(AS)
400
HSS
400a
HSS OF SOURCE UE
500
SMS-IWMSC
600
SMS-SC
S1610
IMS REGISTRATION
ROUTEING INFO (S1630)
MESSAGE TRANSFER (S1620)
ROUTEING INFO
S1632
ROUTEING INFO (S1634)
FORWARD SHORT MESSAGE (S1640)
REQUEST SIP URI OF SOURCE UE
S1650
RESPONSE SIP URI OF SOURCE UE
S1655
DELIVERY REPORT (S1680)
DELIVERY REPORT (S1685)
MESSAGE
S1660
OK
S1666
DELIVERY REPORT
S1672
ACCEPTED
S1674
MESSAGE
OK
DELIVERY REPORT
ACCEPTED
S1662
S1664
S1670
S1676

FIG. 17

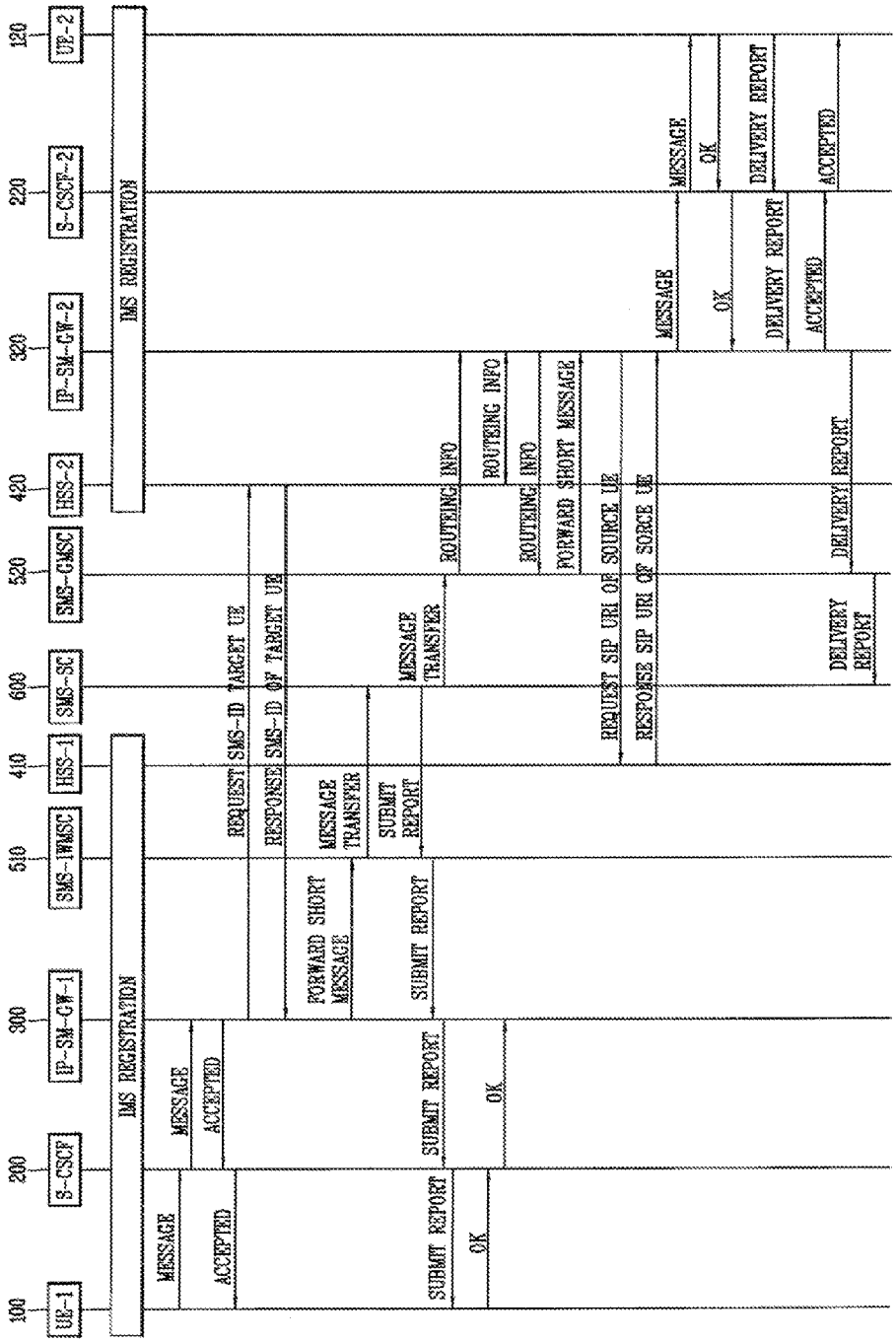
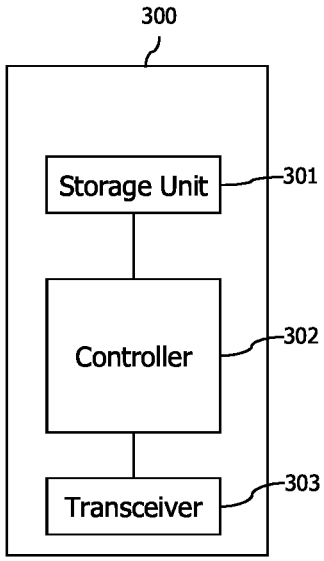

100
UE-1
200
S-CSCF
300
IP-SM-GW-1
510
SMS-IWMSC
410
HSS-1
600
SMS-SC
520
SMS-GMSC
420
HSS-2
320
IP-SM-GW-2
220
S-CSCF-2
120
UE-2
IMS REGISTRATION
IMS REGISTRATION
MESSAGE
ACCEPTED
MESSAGE
ACCEPTED
REQUEST SMS-ID OF TARGET UE
RESPONSE SMS-ID OF TARGET UE
FORWARD SHORT MESSAGE
MESSAGE TRANSFER
SUBMIT REPORT
SUBMIT REPORT
SUBMIT REPORT
OK
ROUTEING INFO
ROUTEING INFO
ROUTEING INFO
FORWARD SHORT MESSAGE
REQUEST SIP URI OF SOURCE UE
RESPONSE SIP URI OF SORCE UE
MESSAGE
OK
DELIVERY REPORT
ACCEPTED
MESSAGE
OK
DELIVERY REPORT
ACCEPTED
DELIVERY REPORT
DELIVERY REPORT

FIG. 18



METHOD AND DEVICE FOR DELIVERING MESSAGES

CROSS REFERENCE TO RELATED APPLICATIONS

This application is the National Phase of PCT/KR2012/004235 filed on May 30, 2012, which claims priority under 35 U.S.C. 119(e) to U.S. Provisional Application No. 61/502,864 filed on Jun. 30, 2011 and under 35 U.S.C. 119(a) to Patent Application No. 10-2012-0042824 filed in Korea on Apr. 24, 2012, all of which are hereby expressly incorporated by reference into the present application.

TECHNICAL FIELD

The specification relates to a method and an apparatus for a terminal without an MSISDN associated with IMS subscriber information to transmit and receive a short message.

BACKGROUND ART

A 3GPP that establishes a technology standard of a 3^{rd} generation mobile communication system has started a research into long term evolution/system architecture evolution (LTE/SAE) technology as part of an effort to optimize and improve performance of 3 GPP technologies from the end of 2004 in order to cope with various forums and new technologies associated with 4^{th} generation mobile communication.

SAE that is progressed around 3GPP SA WG2 is a research into network technology to determine a structure of a network with an LTE work of a 3GPP TSG RAN and support mobility between model networks and one of key standardization issues of the 3GPP. This is a work for developing a 3GPP system to a system that supports various wireless access technologies based on an IP and the work has been progressed for the purpose of an optimized packet based system that minimizes a transmission delay with a further improved data transmission capability.

An SAE higher-level reference model defined in the 3GPP SA WG2 includes a non-roaming case and a roaming case of various scenarios, and a detailed content may be referred in TS 23.401 and TS 23.402 which are 3GPP standard documents.

FIG. **1** is a structural diagram of an evolved mobile communication network.

One of largest features of the network structure of FIG. **1** is based on a 2 tier model of eNodeB of an evolved UTRAN and a gateway of a core network and although accurately coincides with each other, the eNodeB **920** has functions of NodeB and RNC of an existing UMTS system and the gateway has an SGSN/GGSN function of the existing system.

Another key feature is that a control plane and a user plane between an access network and the core network are switched to different interfaces. In the existing UMTS system, one Iu interface exists between an RNC and an SGSN, while a mobility management entity (MME) **951** that undertakes processing of a control signal has a structure separated from a gateway (GW), and as a result, two interfaces of S1-MME and S1-U are respectively used. The GW includes a serving-gateway (hereinafter, referred to as 'S-GW') **952** and a packet data network gateway (hereinafter, referred to as 'PDN-GW' or 'P-GW') **953**.

FIG. **2** is a diagram illustrating the relationship between (e)NodeB and Home (e)NodeB.

In the 3^{rd} or 4^{th} mobile communication system, an attempt to increase a cell capacity is continuously made in order to support a high-capacity service and a bidirectional service such as multimedia contents, streaming, and the like.

That is, as various large-capacity transmission technologies are required with development of communication and spread of multimedia technology, a method for increase a radio capacity includes a method of allocating more frequency resources, but there is a limit in allocating more frequency resources to a plurality of users with limited frequency resources.

An approach to use a high-frequency band and decrease a cell radius has been made in order to increase the cell capacity. When a cell having a small radius, such as a pico cell is adopted, a band higher than a frequency used in the existing cellular system may be used, and as a result, it is possible to transfer more information. However, since more base stations should be installed in the same area, higher cost is required.

In recent years, a femto base station such as a Home (e)NodeB **930** has been proposed while making the approach to increase the cell capacity by using the small cell.

The Home (e)Node **930** has been researched based on a RAN WG3 of the 3GPP Home (e)NodeB and in recent years, the Home (e)NodeB **30** has been in earnest researched even in an SA WG.

The (e)NodeB **920** illustrated in FIG. **2** corresponds to a macro base station and the Hoem (e)NodeB **930** illustrated in FIG. **2** may correspond to the femto base station. In the specification, (e)NodeB intends to be described based on terms of the 3GPP and (e)NodeB is used when NodeB and eNodeB are mentioned together. Further, Home (e)NodeB is used when Home NodeB and Home eNodeB are mentioned together.

The (e)NodeB **920** transmits and receives signals of the MME **951** and the control plane and transmits and receives signals of the S-GW **952** and the user plane. Similarly, the (e)NodeB **930** also transmits and receives signals of the MME **951** and the control plane and transmits and receives data of the S-GW **952** and the user plane. The PDN-GW **953** serves to transmit and receive the data from the S-GW **952** to an IP service network of a mobile communication provider.

Interfaces marked with dotted lines are used to transmit control signals among the (e)NodeB **920**, the Home (e)NodeB **930**, and then MME **951**. In addition, interfaces marked with solid lines are used to transmit the data of the user plane.

FIG. **3** is an exemplary diagram illustrating a structure of a network including a Home Node and a Home (e)NodeB.

As illustrated in FIG. **3**A, a core network **950** includes the MME **951**, the serving gateway (S-GW) **952**, an SGSN **956**, and a packet data network gateway (P-GW) **953**. Besides, the core network **950** may further include a PCRF **954** and an HSS **955**.

FIG. **3**A illustrates the Home NodeB **931** by a UMTS terrestrial radio access network (UTRAN) and the Home eNodeB **932** by an evolved-UTRAN (E-UTRAN). The Home NodeB **931** by the UTRAN is connected with the SGSN **956** through a gateway **935**. The Home eNodeB **932** by the E-UTRAN is connected with the MME **951** and the S-GW **952**. In this case, the control signal is transferred to the MME **951** and the user data signal is transferred to the

S-GW **952**. Further, the gateway **935** may be present between the Home eNodeB **932** by the E-UTRAN and the MME **951**.

Meanwhile, referring to FIG. **3**B, an interface of the Home eNodeB **932** by the E-UTRAN is illustrated. The Home eNodeB **932** by the E-UTRAN and the gateway **935** are called a Home eNodeB subsystem. The Home eNodeB **932** by the E-UTRAN is connected with a UE **910** through an LTE-Uu interface. The Home eNodeB **932** and the MME **951** are connected through an S1-MME interface. In addition, the Home eNodeB **932** and the S-GW **952** are connected through an S1-U interface. In this case, the S1-MME interface and the S1-U interface may pass through the gateway **935**. The MME **951** and the S-GW **952** are connected through an S11 interface. In addition, the MME **951** and the HSS **955** are connected through an S6a interface.

FIG. **4** is an exemplary diagram illustrating an interface between he Home eNodeB and the MME illustrated in FIG. **3**.

As illustrated in FIG. **4**, each of the Home eNodeB **932** and the MME **951** includes a first layer (physical layer), a second layer (medium connection control layer), a third layer (Internet protocol (IP) layer), a signaling control transmission protocol (SCTP), and an S1 application protocol (S1-AP).

The S1-AP is an application layer protocol between the Home eNodeB **932** and the MME **951**. The STCP assures transferring of a signaling message between the Home eNodeB **932** and the MME **951**.

FIGS. **5***a* and **5***b* are general structural diagrams of an IP-connectivity access network (IP-CAN) that provides a short message.

Referring to FIG. **5***a*, an IP-short-message-gateway (IP-SM-GW) performs protocol interworking in order to transmit and receive a short message of an IP based terminal. That is, when the IP-SM-GW receives an SIP message including short message service associated information (for example, a mobile originated short message), a delivery report, and the like, the IP-SM-GW extracts and delivers the SMS associated information. In this case, a protocol used in communication between an MSC or an SGSN and an SMS-GMSC/SMS-IWMSC is applied under the existing GSM/UMTS environment. On the contrary, when the IP-SM-GW receives from the SMS-GMSC/SMS-IWMSC SMS associated information (for example, a mobile terminated short message, a submit report, and the like) toward the IP based terminal, the information contained in the SIP message is delivered to the IP based terminal. In this case, a protocol used in communication between an MSC or an SGSN and an SMS-GMSC/SMS-IWMSC is applied under the existing GSM/UMTS environment.

The SMS associated information is included in a transfer protocol data unit (TPDU) transferred through a short message transfer layer (SM-TL) of FIG. **5***b* and the TPDU is encapsulated in a relay protocol data unit transferred through a short message relay layer (SM-RL) to be transferred.

DISCLOSURE

Technical Problem

As described above in an operation of the related art, since space among an IP-SM-GW, an IMS core, and an IP based terminal is an SIP section, even though a mobile subscriber integrated services digital network number (MSISDN) of the IP based terminal associated with IMS subscriber information is not present, an SMS associated message can be switched. However, other sections, that is, in a section between the IP-SM-GW and the SMS-GMSC/SMS-IWMSC and a section between the IP-SM-GW and an HSS, the MSISDN is required.

Therefore, in order for the IP based terminal to send and receive a short message to and from other UEs, the MSISDN associated with IMS subscriber information to which the IP based terminal belongs is required. A more detailed description can be known with reference to 3GPP TS 23.204.

In recent years, an interest in a possibility and an incrementality of a user who just subscribes in a packet switched data network without the MSISDN has been concentrated and a method for the users to use an SMS is required.

DISCLOSURE OF THE INVENTION

In order to achieve the aforementioned object, the present invention provides a method in which a gateway interworking messages of heterogeneous protocols for a sending terminal processes a message. The method may comprise: acquiring a temporary identifier of the sending terminal when the sending terminal is a terminal that subscribes in an IP multimedia subsystem (IMS) without a mobile communication global unique number, wherein the temporary identifier is an identifier used for transmitting a short message during an IMS registration valid period of the sending terminal; receiving a session initiation protocol (SIP) based message transmitted by the sending terminal from an IMS based session controller; acquiring a temporary identifier of a receiving terminal based on an SIP based identifier of the receiving terminal encapsulated in the SIP based message; generating a short message service (SMS) based message based on the received SIP based message, the temporary identifier of the receiving terminal, and the temporary identifier of the transmitting terminal; and transmitting the generated SMS based message to a switcher.

The generating of the SMS based message may include: decapsulating the SMS based message encapsulated in the received SIP based message; and adding the temporary identifier of the receiving terminal and the temporary identifier of the sending terminal to the decapsulated SMS based message.

In the acquiring of the temporary identifier of the sending terminal, a home subscriber server of the sending terminal receives a temporary identifier allocated through an IMS registration procedure.

In the acquiring of the temporary identifier of the sending terminal, the IMS based session controller receives the temporary identifier allocated through the IMS registration procedure.

In the acquiring of the temporary identifier of the sending terminal, the gateway allocates the temporary identifier through the IP multimedia subsystem (IMS) registration procedure.

The temporary identifier may include a country code (CC) field, a national destination code (NDC) field, and a subscriber number (SN) field, and the SN field may be generated arbitrarily or sequentially or based on an instance ID transmitted which the sending terminal transmits in IMS registration or based on subscriber information of the sending terminal.

The NDC field may be generated differently for each gateway.

The temporary identifier may be generated based on an international mobile subscriber identity (IMSI) or an integrated circuit card ID (ICCID) of the terminal.

In the acquiring of the temporary identifier of the receiving terminal, the gateway may receive the temporary identifier from a home subscriber server of the receiving terminal.

In the acquiring of the temporary identifier of the receiving terminal, the gateway may receive the temporary identifier from the IMS based session controller, and the IMS based session controller may receive the temporary identifier the home subscriber server of the receiving terminal.

The IMS based session controller may be a serving-call session control function (S-CSCF).

The mobile communication global unique number may be a mobile subscriber integrated services digital number (MSISDN).

The present invention provides a method in which a gateway interworking messages of heterogeneous protocols for a receiving terminal that subscribes in an IP multimedia subsystem (IMS) without a mobile communication global unique number processes a message. The method may comprise: receiving an SMS based message from a switcher; acquiring identification information of a sending terminal based on a temporary identifier of the sending terminal, which is encapsulated in the SMS based message, the temporary identifier being an identifier used for transmitting a short message during an IMS registration valid period of the sending terminal; generating a session initiation protocol (SIP) based message based on the received SMS based message and the identification information of the sending terminal; and transmitting the generated SIP based message to an IMS based session controller.

The generating of the SIP based message may include: encapsulating the received SMS based message in the SIP based message; and adding the identification information of the sending terminal to the encapsulated SIP based message.

In the acquiring of the identification information of the sending terminal, the gateway may receive the identification information from a home subscriber server of the sending terminal.

The identification information of the sending terminal may be an SIP uniform resource identifier (URI).

The IMS based session controller may be a serving-call session control function (S-CSCF).

The mobile communication global unique number may be a mobile subscriber integrated services digital number (MSISDN).

There is provided a gateway interworking messages of heterogeneous protocols for a sending terminal. the gateway may comprise: a transmitting/receiving unit for transmitting/receiving a signal to/from the outside; and a control unit connected with the transmitting/receiving unit, wherein the control unit is configured to control the transmitting/receiving unit to acquire a temporary identifier of the sending terminal when the sending terminal is a terminal that subscribes in an IP multimedia subsystem (IMS) without a mobile communication global unique number, the temporary identifier being an identifier used for transmitting a short message during an IMS registration valid period of the sending terminal; control the transmitting/receiving unit to receive a session initiation protocol (SIP) based message transmitted by the sending terminal from an IMS based session controller; control the transmitting/receiving unit to acquire a temporary identifier of a receiving terminal based on an SIP based identifier of the receiving terminal encapsulated in the SIP based message, generate a short message service (SMS) based message based on the received SIP based message, the temporary identifier of the receiving terminal, and the temporary identifier of the transmitting terminal; and control the transmitting/receiving unit to transmit the generated SMS based message to a switcher.

The control unit may be configured to decapsulate the SMS based message encapsulated in the received SIP based message, and add the temporary identifier of the receiving terminal and the temporary identifier of the sending terminal to the decapsulated SMS based message to generate the SMS based message.

There is provided a gateway interworking messages of heterogeneous protocols for a receiving terminal. The gateway may comprise: a transmitting/receiving unit for transmitting/receiving a signal to/from the outside; and a control unit connected with the transmitting/receiving unit. The control unit may be configured to control the transmitting/receiving unit to receive an SMS based message from a switcher; control the transmitting/receiving unit to acquire identification information of a sending terminal based on a temporary identifier of the sending terminal, which is encapsulated in the SMS based message, the temporary identifier being an identifier used for transmitting a short message during an IMS registration valid period of the sending terminal; generate a session initiation protocol (SIP) based message based on the received SMS based message and the identification information of the sending terminal, and control the transmitting/receiving unit to transmit the generated SIP based message to an IMS based session controller.

According to embodiments of the present invention, the present invention has an advantage that a terminal that does not have an MSISDN associated with IMS subscriber information can transmit and receive an IP based short message.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a structural diagram of an evolved mobile communication network.

FIG. **2** is a diagram illustrating a relationship between (e)NodeB and Home (e)NodeB.

FIG. **3** is an exemplary diagram illustrating a structure of a network including a Home Node and a Home (e)NodeB.

FIG. **4** is an exemplary diagram illustrating an interface between the Home eNodeB and an MME illustrated in FIG. **3**.

FIGS. **5***a* and **5***b* are general structural diagrams of an IP-connectivity access network (IP-CAN) that provides a short message.

FIG. **6** is a flowchart illustrating a sending procedure of a short message in related art.

FIG. **7** is a flowchart illustrating a receiving procedure of the short message in related art.

FIG. **8** is a flowchart illustrating an IMS registration procedure in related art.

FIG. **9** is a structural diagram of a mobile subscriber integrated services digital network (MSISDM).

FIG. **10** is a first embodiment of a process of allocating a temporary identifier according to the specification.

FIG. **11** is a second embodiment of a process of allocating a temporary identifier according to the specification.

FIG. **12** is a third embodiment of a process of allocating a temporary identifier according to the specification.

FIGS. **13***a* and **13***b* are diagrams illustrating a process of acquiring a temporary identifier of a short message receiving terminal.

FIG. **14** is one embodiment of a process of transmitting a short message according the specification.

FIGS. **15***a* and **15***b* are diagrams illustrating a process of acquiring ID information of a short message sending terminal.

FIG. **16** is one embodiment of a process of receiving a short message according to the specification.

FIG. **17** is one embodiment of a process of transmitting and receiving a short message according to the specification.

FIG. **18** is an internal block diagram of a gateway according to an embodiment of the specification.

MODES FOR CARRYING OUT THE PREFERRED EMBODIMENTS

The present invention is described based on a universal mobile telecommunication system (UMTS) and an evolved packet core (EPC), but the present invention is not limited to the communication system, but may be applied to even all communication systems and methods to which the technical spirit of the present invention can be applied.

It is noted that Technical terms used in the specification are used to just describe a specific embodiment and do not intend to limit the present invention. Further, if the technical terms used in the specification are not particularly defined as other meanings in the specification, the technical terms should be appreciated as meanings generally appreciated by those skilled in the art and should not be appreciated as excessively comprehensive meanings or excessively reduced meanings. Further, when the technical term used in the specification is a wrong technical term that cannot accurately express the spirit of the present invention, the technical term is substituted by a technical term which can correctly appreciated by those skilled in the art to be appreciated. In addition, a general term used in the present invention should be analyzed as defined in a dictionary or according to front and back contexts and should not be analyzed as an excessively reduced meaning.

Moreover, if singular expression used in the specification is not apparently different on a context, the singular expression includes a plural expression. Further, in the present invention, it should not analyzed that a term such as "comprising" or "including" particularly includes various components or various steps disclosed in the specification and some component or some steps among them may not included or additional components or steps may be further included.

In addition, terms including ordinal numbers, such as 'first', 'second', etc. can be used to describe various components, but the components should not be limited by the terms. The above terminologies are used only to discriminate one component from the other component. For example, a first component may be named as a second component and similarly, the second component may also be named as the first component.

It should be understood that, when it is described that an element is "coupled" or "connected" to another element, the element may be "directly coupled" or "directly connected" to the another element or "coupled" or "connected" to the another element through a third element. In contrast, it should be understood that, when it is described that an element is "directly coupled" or "directly connected" to another element, it is understood that no element is not present between the element and the another element.

Hereinafter embodiments of the present invention will be described in detail with reference to the accompanying drawings, in which like or similar reference numerals refer to like elements regardless of reference numerals and a duplicated description thereof will be omitted. In describing the present invention, when it is determined that the detailed description of the known art related to the present invention may obscure the gist of the present invention, the detailed description thereof will be omitted. Further, it is noted that the accompanying drawings are used just for easily appreciating the spirit of the present invention and it should not be analyzed that the spirit of the present invention is limited by the accompanying drawings. It should be analyzed that the spirit of the present invention is extended up to all changes, equivalents, or substitutions in addition to the accompanying drawings.

Hereinafter, a terminology called a terminal is used, but the terminal may be called user equipment (UE), mobile equipment (ME), or a mobile station (MS). Further, the UE may be portable devices such as a cellular phone, a PDA, a smart phone, a notebook, and the like or Importable devices such as a PC, a vehicle mounted device, and like.

Definition of Terminologies

Hereinafter, terminologies used in the specification will be defined in brief in order to assist understanding the present invention before a description referring the accompanying drawings.

UMTS: Represents a 3^{rd} mobile communication network as an abbreviation of universal mobile telecommunication system.

EPS: represents a core network that supports a long term evolution (LTE) network as an abbreviation of evolved packet system. A network evolved from the UMTS.

UE (User Equipment): The UE may be mentioned as terminologies such as the terminal, the mobile equipment (ME), and the like. Further, the UE may be portable devices such as a notebook, a cellular phone, a PDA, a smart phone, a multimedia device, and the like or Importable devices such as a PC, a vehicle mounted device, and like.

IMS (IP Multimedia Subsystem): As a network technique which may perform PS Packet Switching based on an Internet Protocol (IP) up to not only a wired terminal but also a wireless terminal, it is provided to connect both wired/wireless terminals through an IP (All-IP).

The IMS-based network includes a home subscriber server (HSS) including a database storing subscriber information of a user, and other entities. Further, the IMS-based network includes a call session control function (CSCF) for processing a procedure for control signaling, registration, and session. The CSCF may include a P-CSCF (Proxy-CSCF), an S-CSCF (Serving-CSCF), and an I-CSCF (Interrogating-CSCF). The P-CSCF operates as a first access point for user equipment (UE) in the IMS-based network. In addition, the S-CSCF processes the session in the IMS-based network. That is, the S-SCSF, as an entity serving to route the signaling, routes the session the IMS-based network. In addition, the I-CSCF operates at an access point with another entity in the IMS-based network.

2) The IPS-based session is controlled by a session initial protocol (SIP) under the IMS. The SIP is a protocol for controlling the session, and the SIP means a signaling protocol indicating a procedure for distinguishing the terminals for communication from each other to find the position thereof, generating a multimedia session between the terminals, or deleting and modifying the generated session. The SIP may provide a service without subordinating to an SIP uniform resource identifier (URI) similar to an email address in order to distinguish the respective users.

MSISDN (Mobile Subscriber Integrated Services Digital Network Number): MSISDN is a number uniquely identifying a subscription (subscriber) in a GSM or a UMTS network. The detailed description refers to the standard document 3GPP TS 23.003, TS 22.101.

IP-SM-GW (IP-Short-Message-Gateway): Application server providing the protocol interworking for delivery of

the short message between an IP-based terminal and a short message service-service centre (SMS-SC). The detailed description refers to the standard document 3GPP TS 23.204.

Application server (AS): Server providing various multimedia services.

Registration: Represents a process in which the terminal itself notifies information associated with a present location thereof to the home network, that is, a process of accessing the home network by transmitting the present location thereof and other information.

Instance-ID (Instance identifier): Represents an SIP access header parameter to uniquely identify an SIP UA that performs registration. When international mobile station equipment identities (IMEI) are used, instance-id needs a format of an IMEI URN. If the IMEI may not be used, the instance-id needs to take an expression format of a UUID as a URN defined in IETF RFC 4122. Refer to standard document 3GPP TS 23.003 for a detailed description thereof.

IMPU (IP Multimedia PUblic identity): An IMS user has one or more IMPUs (that is, public user identity) in order to communicate with other users. Further, a plurality of UEs may share one IMPU. The IMPU follows an SIP uniform resource identifier (URI) or Tel URI format.

SME (Short Message Entity): represents an entity capable of transmitting or receiving the short message, and refer to standard document 3GPP TS 23.040 for a detailed description thereof.

iFC (Initial Filter Criteria): Represents a filter criterion which is stored in the HSS as a part of a user profile and downloaded to the S-CSCF in user registration. Refer to standard document 3GPP TS 23.218 for a detailed description thereof.

Hereinafter, the present invention will be described in detail with reference to the accompanying drawings.

FIG. **6** is a flowchart illustrating a sending procedure of a short message in related art.

A terminal (hereinafter, referred to as UE-1) **10** performs registration in an IMS network (S**610**). Thereafter, the UE-1 **10** transmits an SIP MESSAGE request message encapsulating a short message to an S-CSCF **20** (S**620**). In this case, a body of the SIP MESSAGE request message includes RP-DATA and the RP-DATA includes an SMS header and SMS user information encoded based on 3GPP TS 23.040.

An S-CSCF **20** forwards the SIP MESSAGE request message to an IP-SM-GW (AS) **30** based on a prestored iFC (S**625**).

The IP-SM-GW (AS) **30** sends an SIP 202 ACCEPTED message which is a response to the received SIP MESSAGE request message to the S-CSCF **20** (S**630**) and forwards the received SIP 202 ACCEPTED message to the UE-1 **10** (S**635**).

The IP-SM-GW (AS) **30** performs a service authorization procedure based on stored subscriber information. That is, the IP-SM-GW (AS) **30** checks permitting the UE-1 **10** that sends the SIP MESSAGE request message including the short message to use a short message service. When the service authorization is succeeded, the IP-SM-GW (AS) **30** extracts the short message encapsulated in the received SIP MESSAGE request message in step S**625** and transmits the extracted short message to an SMS-IWMSC **50** (S**640**). In this case, the IP-SM-GW (AS) **30** transmits the extracted short message to the SMS-IWMSC **50** by using a MAP-MO-FORWARD-SHORT-MESSAGE.

The SMS-IWMSC **50** forwards the received short message to the SMS-SC **60** (S**645**).

The SMS-SC **60** transmits a Submit Report to the SMS-IWMSC **50** (S**650**) and the SMS-IWMSC **50** transmits the Submit Report to the IP-SM-GW (AS) **30** (S**652**).

The IP-SM-GW (AS) **30** transmits the SIP MESSAGE request message encapsulating the received Submit Report to the S-CSCF **20** (S**654**). The S-CSCF **20** sends the SIP MESSAGE request message including the Submit Report to the UE-1 **10** (S**656**).

The UE-1 **10** that receives the Submit Report sends an SIP 200 OK message which is a response thereto to the S-CSCF **20** (S**660**). The S-CSCF **20** forwards the received response message to the IP-SM-GW (AS) **30** (S**665**).

In the aforementioned short message transmitting procedure, an address of a receiver of the short message is included in an RP-User-Data of the RP-DATA. In detail, a TP destination address (TP-DA) field of a transfer protocol data unit (TPDU) configuring the RP-User-Data. In the short message transmitting procedure of FIG. **6**, the IP-SM-GW (AS) **30** makes an address of a transmitter (that is, UE-1) of the short message be included in an RP-Originator Address (information element) IE of the RP-DATA. In this case, the address of the transmitter included is an MSISDN of the UE-1.

FIG. **7** is a flowchart illustrating a receiving procedure of the short message in related art.

The UE-1 **10** performs registration in an IMS network (S**710**). Thereafter, the SMS-SC **60** transmits the short message to an SMS-GMSC **51** (S**720**).

The SMS GMSC **51** that receives the short message transmits a Routing Info request message to an HSS **40** in order to retrieve routing information and the HSS **40** forwards to the IP-SM-GW (AS) **30** the Routing Info request message based on an address of a pre-configured IP-SW-GW of the UE-1 **10** which is the receiver of the short message (S**732**). In detail, the SMS-GMSC **51** sends a MAP-SEND-ROUTING-INFO-FOR-SM message including the MSISDN of the UE-1 **10** which is the receiver of the short message to the HSS **40** in order to retrieve the routing information to the receiver of the short message.

The HSS **40** transmits to the IP-SM-GW (AS) **30** an international mobile subscriber identity (IMSI) of the UE-1 **10** which is the receiver of the short message (S**734**). The IP-SM-GW (AS) **30** generates an MT Correlation ID based on the IMSI value received from the HSS **40** in step S**734** and stores the generated MT Correlation ID together with the IMSI value. A detailed matter associated with the generation of the MT Correlation ID refers to a standard document 3GPP TS 23.040. The IP-SM-GW (AS) **30** transmits to the SMS-GMSC **51** a Routing Info response message including the generated MT Correlation ID and an address value thereof (S**736**).

The SMS-GMSC **51** transmits to the IP-SM-GW (AS) **30** the short message including the MT Correlation ID received from the IP-SM-GW (AS) **30** in step S**736** (S**740**). In this case, the SMS-GMSC **51** transmits the short message to the IP-SM-GW (AS) **30** by using a MAP-MT-FORWARD-SHORT-MESSAGE.

The IP-SM-GW (AS) **30** performs the service authorization based on the stored subscriber information. That is, the IP-SM-GW (AS) **30** checks permitting the UE-1 **10** which is the receiver of the short message to use the short message service. When the service authorization is succeeded, the IP-SM-GW (AS) **30** transmits the SIP MESSAGE request message encapsulating the short message received in step S**749** to the S-CSCF **20** (S**742**). In this case, a body of the SIP MESSAGE request message includes the RP-DATA and

the RP-DATA includes an SMS header and SMS user information encoded based on 3GPP TS 23.040.

The S-CSCF **20** sends the received SIP MESSAGE request message to the UE-1 **10** (S**744**).

The UE-1 **10** that receives the short message transmits an SIP 200 OK message which is a response message to the S-CSCF **20** (S**750**) and the S-CSCF **20** forwards the SIP 200 OK message to the IP-SM-GW (AS) **30** (S**755**).

The UE-1 **10** transmits a Delivery Report including a response (positive or negative) to the received short message to the S-CSCF **20** (S**760**) and the S-CSCF **20** forwards the Delivery Report to the IP-SM-GW (AS) **30** (S**765**).

The IP-SM-GW (AS) **30** sends an SIP 202 ACCEPTED message which is a response to the received Delivery Report to the S-CSCF **20** (S**770**) and forwards the received SIP 202 ACCEPTED message to the UE-1 **10** (S**775**).

The IP-SM-GW (AS) **30** transmits the Delivery Report to the SMS-GMSC **51** (S**780**) and the SMS-GMSC **51** transmits the Delivery Report to the SMS-SC **60** (S**785**).

In the aforementioned short message receiving procedure, an address of a transmitter of the short message is encapsulated in the RP-User-Data of the RP-DATA. In detail, the address is encapsulated in a TP originating address (TP-OA) configuring the RP-User-Data. In the short message receiving procedure of FIG. **7**, the IP-SM-GW (AS) **30** sets a Request-URI of the SIP MESSAGE request message as an IMPU of the UE-1 **10** which is the receiver of the short message. In this case, the IP-SM-GW (AS) **30** may find the receiver of the short message based on an MT Correlation ID value generated by using the IMSI value of the UE-1 encapsulated in the received short message.

As illustrated in FIGS. **6** and **7**, the IP-SM-GW needs to find MSISDN information of a terminal served thereby in order to perform protocol interworking for transmission and reception of the SMS of the IP based terminal, in the related art.

FIG. **8** is a flowchart illustrating an IMS registration procedure in related art.

The IP-SM-GW acquires the MSISDN information of the terminal served thereby through the IMS registration procedure.

First, the UE-1 **10** forms IP connection (S**810**). Thereafter, the UE-1 **10** that forms the IP connection transmits an SIP REGISTER request message to the S-CSCF **20** in order to perform IMS registration (S**820**).

The S-CSCF **20** transmits a C-Put/Cx-Pull message to the HSS **40** (S**830**). The HSS **40** sends a Cx-Put Response/Cx-Pull Response message encapsulating the subscriber information of the UE-1 **10** that performs the IMS registration. The S-CSCF **20** sends an SIP 200 OK message which is a response to an SIP REGISTER request message (S**834**).

The S-CSCF **20** analyzes initial filter criteria (iFC) configuring the subscriber information received from the HSS **40** in step 4 (S**840**). As a result, the S-CSCF **20** decides performing third-party registration in the IP-SM-GW (AS) **30** (S**840**).

The S-CSCF **20** transmits the SIP REGISTER request message to the IP-SM-GW (AS) **30** (S**850**). In this case, the S-CSCF **20** encapsulates the MSISDN of the UE-1 **10** that performs the IMS registration in the SIP REGISTER request message, that is, a <service-info> XML element of a message body. The MSISDN information is encapsulated in the iFC configuring the subscriber information received from the HSS **40** in step S**832**. In detail, the MSISDN is encapsulated in service information of the iFC for the IP-SM-GW.

The IP-SM-GW (AS) **30** stores mapping of the IMPU and the MSISDN of the UE-1 **10** that performs the IMS registration.

The IP-SM-GW (AS) **30** transmits the SIP 200 OK message which is the response to the received SIP REGISTER request message to the S-CSCF **20** (S**855**). The IP-SM-GW (AS) **30** transmits an IP-SM-GW Register Request message to the HSS **40** in order to notify that the UE-1 **10** performing the IMS registration is available (that is, may receive the short message) (S**860**). In this case, the IP-SM-GW uses a MAP-ANY-TIME-MODIFICATION message and sets the MSISDN value received from the S-CSCF in step S**850** as an identifier of a subscriber.

The HSS **40** transmits to the IP-SW-GW (AS) **30** an IP SM GW Register Response message which is a response message to the received IP-SM-GW Register Request message (S**865**).

As described in the operation of the related art, the IP-SM-GW that performs the protocol interworking requires the MSISDN information associated with the IMS subscriber information to which the terminal belongs in order for the IP based terminal to send and receive the SMS.

However, a user who subscribes in only a PS without the MSISDN has attracted public attention in recent years, and as a result, a method that allows the users to use the SMS is required. In particular, M2M (machine-to-machine) communication using the SMS has attracted public attention in association with the M2M communication using a mobile communication network in which a standardization operation has been promoted in 3GPP in recent years. Therefore, a case in which the short message is transmitted to various types of M2M terminals (for example, a PS dedicated M2M terminal, an M2M terminal in which both a circuit switched (CS) voice network and the PS are available, and the like) and the short message is received from various types of M2M terminals may be considered.

FIG. **9** is a structural diagram of a mobile subscriber integrated services digital network number (MSISDM).

Referring to 3GPP TS 23.003, a constitution of the MSISDN in the related art is the same as that of FIG. **8**.

A country code (CC) field represents a country code of a country where the terminal is registered (that is, subscribed). A national (significant) mobile number is constituted by NDC and SN fields. In this case, NDC is an abbreviation of National Destination Code and SN is an abbreviation of Subscriber Number.

In the embodiment of the specification, when a terminal (alternatively, an MSISDN-less UE) that does not a mobile communication global unique number (for example, MSISDN) associated with the subscriber information performs the IMS registration, a related entity allocates a temporary identifier (SMS identifier (ID)) to used for the SMS during an IMS registration valid period of the terminal. The related entity may be a gateway (for example, IP-SM-GW) that interworks messages of heterogeneous protocols for a sending terminal, a home subscriber server (HSS), or an IMS based session controller (for example, S-CSCF) or other network entities.

The gateway may generate the temporary identifier by using one of methods described below.

(1) Generating temporary identifier in format such as MSISDN

The gateway may use a prestored (preconfigured) in the gateway as the country code (CC) and national destination code (NDC) values or the CC and NDC values in the subscriber information acquired from the HSS, at the time of generating the SMS-ID. Herein, the CC and NDC values

may be allocated in the same method as a general MSISDN. As a result, even though the SMS-ID is used, a signal and/or a message toward the UE may be routed similarly as the case in which the MSISDN is used and a home network in which the UE subscribes may be found.

The subscriber number (SN) needs to be generated for the MSISDN-less UE that performs the IMS registration and the value needs to be unique in the IMS network. (As a result, the generated SMS-ID is globally unique.) A plurality of gateways may be present in one IMS network. Accordingly, the NDC value may be differently for each gateway in order to avoid a case in which the SMS-ID values generated in different gateways are the same as each other (that is, so that the SMS-ID is unique in one IMS network) or the gateway may put a unique number (if 1 for IP-SM-GW-1 and 2 for IP-SM-GW-2) allocated thereto in a head part of the SN at the time of generating the SN. Alternatively, a range of the SN which each gateway may allocate to the UE is set to prevent the SNs allocated in the respective gateways to duplicate with each other (for example, by a method such as 0~xxxxx for the IP-SM-GW-1 and xxxxx+1~yyyyy for the IP-SM-GW-2).

The SN may be i) generated randomly, ii) generated sequentially, iii) generated by using an Instance-ID transmitted when the UE performs the IMS registration, or iv) generated by using a value encapsulated in the subscriber information of the UE. Besides, various methods may be used.

In the above description, the CC and NDC values are allocated in the same method as in the general MSISDN, and as a result, UEs that belong to different providers may switch the short message. However, when switch of the short message between UEs that belong to the same provider is considered, the CC and NDC values may be arbitrarily allocated. Further, even though the CC and NDC values are allocated in not the same method as but different from the general MSISDN (if a rule for the generation of the SMS-ID is defined differently among providers in order to provide an SMS service in which the MSISDN-less UE intervenes, and the like), the short message may be forwarded.

(2) Generating SMS-ID having new value regardless of format of MSISDN

(3) The SMS-ID may be set by using the existing identifier (for example, IMSI, integrated circuit card ID (ICCID), and the like) instead of generating the new value for the SMS-ID. In this case, all of the existing identifiers may be set as the SMS-ID or the SMS-ID may be set by using only some values thereamong.

Even in the allocation method of (2) or (3), the SMS-ID is allocated to be unique in the IMS network as described in the allocation method of (1). Further, in this case, the SMS-ID for only switching the short message between the UEs that belong to the same provider or the SMS-ID may be allocated so as to switch the short message between UEs that belong to different providers.

The SMS-ID generated for the MSISDN-less UE that performs the IMS registration is released from the gateway when the UE is de-registered.

FIG. **10** is a first embodiment of a process of allocating a temporary identifier according to the specification.

In the embodiment, the gateway (for example, IP-SM-GW) that interworks the messages of the heterogeneous protocols for the sending terminal allocates the temporary identifier. The temporary identifier is an identifier used for the SMS during the IMS registration valid period of the IMS subscribing terminal without the mobile communication global unique number (for example, MSISDN). The temporary identifier may be the SMS-ID. Hereinafter, the gateway that interworks the messages of the heterogeneous protocols for the sending terminal is also called the IP-SM-GW.

First, the UE-1 **100** forms the IP connection (S**1010**). The UE-1 **100** that forms the IP connection transmits a registration request message (for example, SIP based register request message) to an IMS based session controller in order to perform the IMS registration (S**1020**). In this case, the session controller may be an S-CSCF **200** (hereinafter, the session controller is also called the S-CSCF).

The session controller **200** transmits a message (for example, Cx-Put/Cx-Pull message) to request the information on the UE-1 **100** to a home subscriber server (S**1030**). In this case, the home subscriber server may be an HSS **400** (hereinafter, the home subscriber server is also referred to as the HSS).

The HSS **400** sends a response message (for example, the Cx-Put Response/Cx-Pull Response message) encapsulating the subscriber information of the UE-1 **100** that performs the IMS registration.

The session controller **200** sends the response message (for example, the SIP based 200 OK message) to the registration request message to the UE-1 **100** (S**1034**).

The S-CSCF **200** analyzes initial filter criteria (iFC) configuring the subscriber information received from the HSS **400** in step **1032** (S**1040**). As a result, the session controller **200** decides performing 3rd-party registration in the gateway **300**.

The session controller **200** transmits the registration request message (for example, the SIP based REGISTER request message) to the gateway **300** (S**1050**). In this case, since the subscriber information which the session controller **200** receives from the HSS **400** in step S**1032** does not include the mobile communication global unique number information of the UE-1 **100**, the session controller **200** does not encapsulate the mobile communication global unique number information in the registration request message. In this case, the session controller **200** may explicitly notify that the registration request message does not encapsulate the mobile communication global unique number information. (it is specified that there is no mobile communication global unique number information or allocation of the temporary identifier is requested)

Therefore, the gateway **300** that receives the registration request message allocates the temporary identifier (for example, the SMS-ID) for the UE-1 **100** according to the method described in FIG. **9** (S**1060**).

Thereafter, the gateway **300** transmits the response message (for example, SIP 200 OK message) to the registration request message to the session controller **200** (S**1070**).

Further, the gateway **300** transmits the registration request message (for example, IP-SM-GW Register Request message) to the HSS **400** in order to notify that the UE-1 **100** performing the IMS registration may receive the short message (S**1080**). In this case, the gateway **300** may transmit the temporary identifier of the UE-1 **100** by using the MAP-ANY-TIME-MODIFICATION message.

The HSS **400** stores the temporary identifier encapsulated in the received registration request message and transmits the response message (for example, IP SM GW Register Response message) to the request message to the gateway **300** (S**1085**).

FIG. **11** is a second embodiment of a process of allocating a temporary identifier according to the specification.

Unlike FIG. **10**, the home subscriber server (for example, HSS) may allocate the temporary identifier for the IMS subscribing terminal without the mobile communication

global unique number. The temporary identifier is the identifier used for the SMS during the IMS registration valid period of the terminal. The temporary identifier may be the SMS-ID.

The HSS **400** encapsulates the generated temporary identifier in the iFC for the gateway (for example, IP-SM-GW) that interworks the messages of the heterogeneous protocols to allow the IMS based session controller that performs the 3rd-party registration in the gateway to acquire the temporary identifier.

Steps **S1110** to **S1130** are the same as steps **S1010** to **S1030** of FIG. **10**.

Thereafter, the HSS **400** verifies that there is no mobile communication global unique number of the UE-1 **100** through the subscriber information and allocates the temporary identifier (for example, SMS-ID) for the UE-1 **100** according to the method described in FIG. **9** (**S1060**). The HSS **400** may store the allocated temporary identifier information is connection with the IMPU of the UE-1 **100**.

The Cx-Put/Cx-Pull message received by the HSS in step **S1130** may explicitly encapsulate an indication to request the HSS to allocate the temporary identifier. The indication may be added by the session controller or may be encapsulated when the terminal sends the SIP REGISTER request message to the session controller.

The HSS **400** encapsulates the allocated temporary identifier in the service information of the iFC for the gateway. Thereafter, the HSS **400** sends to the session controller **200** the response message (for example, the Cx-Put Response/Cx-Pull Response message) encapsulating the subscriber information of the UE-1 **100** that performs the IMS registration (**S1150**).

The session controller **200** sends the response message (for example, the SIP based 200 OK message) to the registration request message to the UE-1 **100** (**S155**).

The session controller **200** analyzes the initial filter criteria (iFC) configuring the subscriber information received from the HSS **400** in step **1032** (**S1060**). As a result, the session controller **200** decides performing the 3rd-party registration in the gateway **300**.

The session controller **200** transmits the registration request message (for example, the SIP based REGISTER request message) to the IP-SM-GW **300** (**S1170**). In this case, the session controller **200** encapsulates the temporary identifier information of the UE-1 **100** in the registration request message (for example, <service-info> XML element of the message body). The temporary identifier information may be encapsulated in the iFC. The gateway **300** stores mapping of the IMPU of the UE-1 **100** and the temporary identifier.

Thereafter, the gateway **300** transmits the response message (for example, SIP 200 OK message) to the registration request message to the session controller **200** (**S1175**).

Further, the gateway **300** transmits the registration request message (for example, IP-SM-GW Register Request message) to the HSS **400** in order to notify that the UE-1 **100** performing the IMS registration may receive the short message (**S1180**). In this case, the gateway **300** may transmit the temporary identifier of the UE-1 **100** by using the MAP-ANY-TIME-MODIFICATION message.

The HSS **400** transmits the response message (for example, IP SM GW Register Response message) to the received registration request message to the gateway **300** (**S1185**).

In FIG. **11**, the HSS allocates the temporary identifier before transmitting the subscriber information to the session controller, but contrary to this, the temporary identifier is generated when the subscriber subscribes in the service to be stored in the iFC for the gateway. In this case, the temporary identifier is used during the IMS registration valid period of the terminal, but may be permanently used during a period when the subscriber subscribes in the service.

FIG. **12** is a third embodiment of a process of allocating a temporary identifier according to the specification.

Unlike FIG. **10** or FIG. **11**, the IMS based session controller (for example, S-CSCF) may allocate the temporary identifier for the IMS subscribing terminal without the mobile communication global unique number. The temporary identifier is the identifier used for the SMS during the IMS registration valid period of the terminal. The temporary identifier may be the SMS-ID.

The session controller may provide the generated temporary identifier to the gateway (for example, IP-SM-GW) that interworks the messages of the heterogeneous protocols in the 3rd-party registration.

Steps **S1210** to **S1234** are the same as steps **S1010** to **S1034** of FIG. **10**.

Thereafter, the session controller **200** analyzes the iFC received from the HSS **400** in step **S1232** (**S1240**). As a result, the session controller **200** decides performing the 3rd-party registration in the gateway **300**.

In this case, since the iFC does not encapsulate the mobile communication global unique number information for the UE-1 that performs the IMS registration, the session controller **200** decides allocating the temporary identifier. Alternatively, the UE-1 **100** may explicitly request to the session controller allocating the temporary identifier therefor at the time of sending the SIP REGISTER request message for the IMS registration.

The session controller **200** allocates the temporary identifier (for example, SMS-ID) for the UE-1 **100** according to the method described in FIG. **9** (**S1250**).

The session controller **200** transmits the registration request message (for example, the SIP based REGISTER request message) to the gateway **300** (**S1260**). In this case, the session controller **200** encapsulates the temporary identifier information of the UE-1 **100** in the registration request message (for example, <service-info> XML element of the message body). The temporary identifier information may be encapsulated in the iFC. The gateway **300** stores mapping of the IMPU of the UE-1 **100** and the temporary identifier. Additionally, the session controller **200** may encapsulate a parameter to specify the temporary identifier value notified to the IP-SM-GW is an ID allocated for the SMS, in the SIP REGISTER request message.

Thereafter, the gateway **300** transmits the response message (for example, SIP 200 OK message) to the registration request message to the session controller **200** (**S1265**).

Further, the IP-SM-GW **300** transmits the registration request message (for example, IP-SM-GW Register Request message) to the HSS **400** in order to notify that the UE-1 **100** performing the IMS registration may receive the short message (**S1270**). In this case, the gateway **300** may transmit the temporary identifier of the UE-1 **100** by using the MAP-ANY-TIME-MODIFICATION message.

The HSS **400** stores the temporary identifier value encapsulated in the received registration request message and transmits the response message (for example, IP SM GW Register Response message) to the request message to the gateway **300** (**S1275**).

Table 1 illustrates a constitution of the aforementioned MAP-ANY-TIME-MODIFICATION message.

TABLE 1

Parameter name	Request	Indication	Response	Confirm
Invoke id	M	M(=)	M(=)	M(=)
gsmSCF-Address	M	M(=)		
Subscriber Identity	M	M(=)		
Modification request for ODB data	C	C(=)		
Modification request for SS information	C	C(=)		
Modification request for CSI	C	C(=)		
Modification request for CSG	C	C(=)		
Long FTN Supported	C	C(=)		
Modification request for IP-SM-GW data	C	C(=)		
Activation request for UE-Reachability	C	C(=)		
Ext Forwarding information-for-CSE			C	C(=)
Ext Call barring information-for-CSE			C	C(=)
ODB Info			C	C(=)
CAMEL subscription info			C	C(=)
User error			C	C(=)
Provider error				O

In step **S1080** of FIG. **10** and step **S1270** of FIG. **12**, when the gateway sends the MAP-ANY-TIME-MODIFICATION message to the HSS, the ID information of the UE needs to be also encapsulated in addition to the temporary identifier. To this end, a method described below may be used.

1) The gateway sets the IMSI value of the UE in Subscriber Identity among parameters of the MAP-ANY-TIME-MODIFICATION of Table 1 and sets the temporary identifier value in a newly defined parameter. The gateway may be acquired the IMSI value of the UE from the UE or another network node.

2) The gateway sets the temporary identifier value of the UE in Subscriber Identity among the parameters of the MAP-ANY-TIME-MODIFICATION of Table 1 and sets the ID value of the UE in type newly defined parameter. In this case, as the ID value of the UE, even any information to recognize that the HSS is a specific UE (alternatively, subscriber), such as the IMSI, the IMPU, or the like may be used without limit.

Further, the gateway may add a parameter to specify that the temporary identifier value sent to the HSS is the ID allocated for the SMS to the MAP-ANY-TIME-MODIFICATION request message, in 1) and 2).

FIGS. **13***a* and **13***b* are diagrams illustrating a process of acquiring a temporary identifier of a short message receiving terminal.

As described in FIGS. **6** and **7**, each of the address of the short message transmitter and the address of the short message receiver are the MSISDN of each of the transmitter and the receiver, and are forward with being encapsulated in the RP-DATA.

However, both a sending terminal (or a source terminal) and a receiving terminal (or a target terminal) of the short message are IMS subscribing terminals without mobile communication global unique numbers, a network entity serving as the sending terminal for transferring the short message or the sending terminal needs to know a temporary identifier (for example, SMS-ID) value of the receiving terminal. The temporary identifier of the receiving terminal is required when a TP-DA field configuring a SMS-SUBMIT-type TPDU as an example is set. A method of obtaining the temporary identifier value allocated to the receiving terminal of the short message is as follows. (1) Method of acquiring a temporary identifier value from a home subscriber server (for example, HSS) of the receiving terminal by the gateway (for example, IP-SM-GW) serving as the sending terminal

Since the short message sending terminal does not know mobile communication global unique number information for the receiving terminal, the sending terminal includes an SIP URI which is an IMPU of the receiving terminal in a SIP-based message (for example, SIP MESSAGE request) without setting the TP-DA field of the TPDU.

When the gateway receives the short message, the gateway acquires the temporary identifier (for example, SMS-ID) value allocated to the receiving terminal form the home subscriber server as illustrated in FIG. **13**A (**S1310** and **S1320**), and then forwards the short message to a switcher (for example, SMS-IWMSC) by setting the value in the TP-DA field (**S1330**).

In step **S1320** of FIG. **13**A, the gateway may receive not only the SMS-ID information of the receiving terminal but also information on availability (that is, IMS registration) of the receiving terminal.

When the home subscriber server of the receiving terminal does not have the SMS-ID value allocated to the receiving terminal, the home subscriber server of the receiving terminal transmits a response informing that the temporary identifier value is not allocated. In this case, the gateway may transmit a transmission fail message informing that the short message may not be transmitted to the sending terminal, instead of forwarding the short message to the switcher.

Further, the gateway stores the short message, and then subscribes to a notification service notify the temporary identifier information for the receiving terminal. Thereafter, when the gateway knows the SMS-ID information of the receiving terminal, the stored short message may also be transmitted to the receiving terminal. To this end, the network needs to operate an entity or a functionality supporting the notification service, and the entity or the functionality may be added/extended to an existing entity or service and may also newly operate.

In FIG. **13**A, the exemplary embodiment in which the gateway directly transmits and receives the message with the home subscriber server to which the receiving terminal belongs is described, but like FIG. **13**B, the gateway may also acquire the temporary identifier information for the receiving terminal through an intermediate node (**S1340** to **S1380**). The intermediate node may have a form adding the aforementioned function to the existing node, and may be a node newly defined for the present invention. Further, when the sending terminal and the receiving terminal belong to different providers, the gateway may also acquire the temporary identifier information allocated to the receiving terminal through an intermediate node (for example, S-intermediate node) in the home network to which the sending terminal belongs and an intermediate node (for example, T-intermediate node) in the home network to which the receiving terminal belongs.

In this case, the gateway may also acquire the temporary identifier information allocated to the receiving terminal through another node between the S-intermediate node and the T-intermediate node. Of course, even though the sending terminal and the receiving terminal belong to different providers, the intermediate node in the home network to which the sending terminal belongs does not pass through the intermediate node in the home network to which the receiving terminal belongs to acquire the temporary identi-

fier information from the home subscriber server to which the receiving terminal belongs.

(2) Method of acquiring a temporary identifier value from a home subscriber server (for example, HSS) of the receiving terminal by an IMS-based session controller (for example, S-CSCF) serving as the sending terminal

Since the short message sending terminal does not know mobile communication global unique number information for the receiving terminal, the sending terminal includes an SIP URI which is an IMPU of the receiving terminal in a SIP-based message (for example, SIP MESSAGE request) without setting the TP-DA field of the TPDU.

When the session controller receives the short message, the session controller acquires the temporary identifier (for example, SMS-ID) value allocated to the receiving terminal from the home subscriber server to which the receiving terminal belongs, and then forwards the short message to the gateway (for example, IP-SM-GW) by setting the value in the TP-DA field.

This method is a method of replacing the gateway with the IMS-based session controller in the method described in the (1). Accordingly, the detailed description follows the description of the (1).

(3) Method of acquiring the temporary identifier (for example, SMS-ID) value allocated to the receiving terminal by subscribing to a notification service notifying the temporary identifier information for the receiving terminal by the sending terminal

For the method, the network needs to operate an entity or a functionality supporting the notification service, and the entity or the functionality may be added/extended to an existing entity or service and may also newly operate.

(4) Method of directly requesting and acquiring the temporary identifier (for example, SMS-ID) information to the receiving terminal by the sending terminal

In this case, the temporary identifier information allocated to the IMS subscribing terminal without the mobile communication global unique number needs to be notified to the terminal in advance. As an example of the method, the sending terminal may request the temporary identifier information to the receiving terminal by using an SIP OPTIONS message.

In the (1) and (2), the network entity serving as the sending terminal acquires the temporary identifier allocated to the receiving terminal, but unlike this, the sending terminal may also directly acquire the information from the home subscriber server of the receiving terminal. In this case, the methods described in the (1) and (2) may be applied.

FIG. **14** is one embodiment of a process of transmitting a short message according the specification.

In the embodiment, it is assumed to use "(1) the method of acquiring a temporary identifier value from a home subscriber server (for example, HSS) of the receiving terminal by the gateway (for example, IP-SM-GW) serving as the sending terminal" among the methods of acquiring the temporary identifier value of the short message receiving terminal.

The UE-1 **100** is the IMS subscribing terminal without the mobile communication global unique number.

The UE-1 **100** performs registration in the IMS network according to the IMS registration procedure of FIGS. **10** to **12**. In this case, the UE-1 **100** receives the temporary identifier. The temporary identifier is an identifier used for the SMS during the IMS registration valid period of the IMS subscribing terminal without the mobile communication global unique number. The temporary identifier may be the SMS-ID.

The UE-1 **100** encapsulates the short message in the SIP-based message (for example, SIP MESSAGE request message) in order to transmit the short message to transmit the encapsulated short message to the IMS-based session controller (for example, S-CSCF **200**) (S**1420**). As an example, a body of the SIP MESSAGE request message includes an RP-DATA, and the RP-DATA may include an SMS header encoded based on 3GPP TS 23.040 and SMS user information.

In this case, since the UE-1 **100** does not have the mobile communication global unique number information for the short message receiving terminal, the UE-1 **100** may transmit the SIP URI which is the IMPU of the receiving terminal included in the SIP MESSAGE request message without setting the TP-DA field of the TPDU. In this case, the SIP URI information of the receiving terminal may be included by using one or more parameters among a header field of the SIP, a body parameter of the header field of the SIP, a tag of the header field of the SIP, a field of the SDP, and an extensible markup language (XML) body.

The session controller **200** transmits the received SIP-based message to the gateway **300** based on the stored iFC (S**1425**). In this case, the session controller **200** may selectively include the temporary identifier (for example, SMS-ID) of the sending terminal in the transmitted SIP based message (for example, P-Asserted-Identity header). In this case, the session controller **200** may also add a parameter indicating that the included temporary identifier value is the ID generated for the SMS.

Thereafter, the gateway **300** transmits the response message (for example, SIP 202 Accepted message) to the received SIP MESSAGE request message to the session controller **200** (S**1430**). The session controller **200** transmits the received response message to the UE-1 **100** (S**1435**).

The gateway **300** performs service authorization based on the stored subscriber information. That is, the gateway **300** checks permitting the UE-1 **100** that sends the SIP based message including the short message to use a short message service. When the service authorization is succeeded, the gateway **300** transmits an information request message to the home subscriber server (for example, HSS **400***a*) of the receiving terminal in order to acquire the temporary identifier (for example, SMS-ID) information of the short message receiving terminal (S**1440**).

The HSS **400** of the receiving terminal transmits the response message to the received information request message to the gateway **300** (S**1445**). The response message includes the temporary identifier (for example, SMS-ID) information allocated to the receiving terminal.

The gateway **300** extracts the short message encapsulated in the received SIP based message in the step 3 to transmit the extracted short message to the switcher (for example, SMS-IWMSC **500**) (S**1450**).

For example, the gateway **300** may transmit the extracted short message to the SMS-IWMSC **500** by using a MAP-MO-FORWARD-SHORT-MESSAGE. In this case, the gateway **300** may set the temporary identifier of the receiving terminal acquired in the step 7 in the TP-DA field. Further, the gateway **300** may set the temporary identifier of the sending terminal in the RP-Originator Address IE of the RP-DATA. Further, the gateway **300** may add a parameter indicating that the encapsulated temporary identifier value of the sending terminal is the identifier generated for the SMS.

The SMS-IWMSC **500** transmits the short message received from the gateway **300** to the SMS server (for example, SMS-SC **600**) (S**1455**).

The SMS-SC **600** transmits an acknowledgment message (for example, submit report) to the SMS-IWMSC **500** (S**1460**). The acknowledgment message is transmitted to the gateway **300** through the SMS-IWMSC **500** (S**1462**).

The gateway **300** encapsulates the acknowledgment message in the SIP based message (for example, SIP MESSAGE request message) to transmit the encapsulated acknowledgment message to the session controller **200** (S**1464**). The session controller **200** transmits the SIP based message to the UE-1 **100** (S**1466**).

The UE-1 **100** receiving the acknowledgment message transmits the SIP based message (for example, SIP 200 OK message) as the response message thereto to the session controller **200** (S**1470**). The session controller **200** transmits the received response message to the gateway **300** (S**1475**).

FIGS. **15***a* and **15***b* are diagrams illustrating a process of acquiring ID information of a short message sending terminal.

As illustrated in FIG. **14**, when the IMS subscribing terminal without the mobile communication global unique number transmits the short message, the receiving terminal of the short message or the network entity serving as the receiving terminal needs to know that any terminal transmits the short message. For example, the receiving terminal or the network entity needs to know that an identifier (for example, SMS-ID) set to a TP originating address (TP-OA) representing an address of the originating SME encapsulated in the received short message is allocated to any terminal. A method of acquiring the ID information, that is, the SIP URI for the sending terminal of the short message by the receiving terminal or the network entity is as follows.

(1) Method of acquiring an ID (for example, SIP URI) of the sending terminal from a home subscriber server (for example, HSS) of the sending terminal by the gateway (for example, IP-SM-GW) serving as the receiving terminal

When the gateway receives the short message toward the receiving terminal, the gateway acquires the ID of the sending terminal from the home subscriber server of the sending terminal by using a temporary identifier (for example, TP-OA value included in the SMS-ID or SMS-DELIVER type TPDU) of the short message sending terminal as illustrated in FIG. **15**A (S**1510**, S**1520**). Thereafter, the gateway transmits the ID information included in the SIP based message (for example, SIP MESSAGE request) to the S-CSCF (S**1530**).

In FIG. **15**A, the gateway sends and receives the message to and from the home subscriber server having the subscriber information of the sending terminal, but as illustrated in FIG. **15**B, the gateway may acquire the ID information of the sending terminal through an intermediate node (S**1540** to S**1580**).

The intermediate node may have a form adding the aforementioned function to the existing node, and may be a node newly defined for the present invention. Further, when the sending terminal and the receiving terminal belong to different providers, the gateway may also acquire the ID information of the sending terminal through an intermediate node (for example, T-intermediate node) in the home network to which the receiving terminal belongs and an intermediate node (for example, S-intermediate node) in the home network to which the sending terminal belongs.

In this case, the gateway may also acquire the ID information of the sending terminal through another node between the T-intermediate node and the S-intermediate node. Of course, even though the sending terminal and the receiving terminal belong to different providers, the intermediate node in the home network to which the receiving terminal belongs does not pass through the intermediate node in the home network to which the sending terminal belongs to acquire the ID information of the sending terminal from the home subscriber server to which the sending terminal belongs.

(2) Method of acquiring an ID (for example, SIP URI) of the sending terminal from a home subscriber server (for example, HSS) of the sending terminal by the IMS based session controller (for example, S-CSCF) serving as the receiving terminal

When the IMS based session controller receives the short message toward the receiving terminal, the session controller acquires the ID of the sending terminal from the home subscriber server of the sending terminal by using a temporary identifier (for example, TP-OA value included in the SMS-ID or SMS-DELIVER type TPDU) of the short message sending terminal. Thereafter, the session controller transmits the ID information included in the SIP based message (for example, SIP MESSAGE request) to the S-CSCF.

This method is a method of replacing the gateway with the session controller in the method described in the (1). Accordingly, the detailed description follows the description of the (1).

(3) Method of acquiring ID information (for example, SIP URI) value of the sending terminal by subscribing a notification service notifying the ID information for the short message sending terminal by the receiving terminal

For the method, the network needs to operate an entity or a functionality supporting the notification service, and the entity or the functionality may be added/extended to an existing entity or service and may also newly operate.

In the (1) and (2), the network entity serving as the receiving terminal acquires the ID information of the short message sending terminal, but unlike this, the receiving terminal may also directly acquire the information from the home subscriber server of the sending terminal. In this case, the methods described in the (1) and (2) may be applied.

FIG. **16** is one embodiment of a process of receiving a short message according to the specification.

The embodiment is a process in which the short message sent by the IMS subscribing terminal without the mobile communication global unique number is transmitted to an IMS subscribing terminal UE-1 without the mobile communication global unique number. In the embodiment, it is assumed to use "(1) the method of acquiring an ID (for example, SIP URI) of the sending terminal from a home subscriber server (for example, HSS) of the sending terminal by the gateway (for example, IP-SM-GW) serving as the receiving terminal" among the methods of acquiring the ID information (for example, SIP URI) of the short message sending terminal.

1) The UE-1 **100** performs registration in the IMS network according to the IMS registration procedure of FIGS. **10** to **12** (S**1610**). In this case, the UE-1 **100** receives the temporary identifier. The temporary identifier is an identifier used for the SMS during the IMS registration valid period of the IMS subscribing terminal without the mobile communication global unique number. The temporary identifier may be the SMS-ID.

2) The SMS server (for example, SMS-SC **600**) transmits the short message to a switcher (SMS-GMSC **500**) (S**1620**). The SMS-GMSC **500** receiving the short message transmits a routing information request message to the home sub-

scriber server (for example, HSS **400**) of the receiving terminal in order to retrieve routing information (S**1630**). The HSS **400** transmits the routing information request message to the gateway **300**, based on a pre-configured address of the gateway (for example, IP-SM-GW) for the UE-1 **100** which is a receiver of the short message. In this case, the SMS-GMSC **500** may send a MAP-SEND-ROUTING-INFO-FOR-SM message including the MSISDN of the UE-1 **100** which is the receiver of the short message to the HSS **400** in order to retrieve the routing information of the receiver of the short message.

The HSS **400** transmits to the gateway **300** an international mobile subscriber identity (IMSI) of the UE-1 **100** which is the receiver of the short message (S**1632**). The gateway **300** generates an MT correlation ID bases on the IMSI value received from the HSS **400** and stores the generated MT Correlation ID together with the IMSI value. A detailed matter associated with the generation of the MT Correlation ID refers to a standard document 3GPP TS 23.040. The gateway **300** transmits to the SMS-GMSC **500** a routing Information response message including the generated MT Correlation ID and an address value thereof (S**1634**).

The SMS-GMSC **500** transmits the short message including the Correlation ID received from the gateway **300** to the gateway **300** (S**1640**). As an example, the SMS-GMSC **500** may transmit the short message to the gateway **300** by using a MAP-MT-FORWARD-SHORT-MESSAGE.

The gateway **300** performs service authorization based on the stored subscriber information. That is, the gateway **300** checks permitting the UE-1 **100** which is the receiver of the short message to use a short message service. When the service authorization is succeeded, the gateway **300** transmits an ID information request message (for example, Request SIP URI message) of the sending terminal to an HSS **400***a* of the sending terminal in order to acquire the ID information for the short message sending terminal, for example, the SIP URI (S**1650**).

The HSS **400***a* of the sending terminal transmits a response message (for example, Response SIP URI message) to the ID information request message received from the gateway **300** to the gateway **300** (S**1655**). The response message may include SIP URI information of the sending terminal.

The gateway **300** encapsulates the received short message in the SIP based message (for example, SIP MESSAGE request message) to transmit the encapsulated short message to the IMS based session controller (for example, S-CSCF **200**) (S**1660**). For example, a body of the SIP MESSAGE request message includes an RP-DATA, and the RP-DATA may include an SMS header encoded based on 3GPP TS 23.040 and SMS user information.

The gateway **300** sends the ID information of the sending terminal included in the SIP based message to the session controller **200**. In this case, for example, SIP URI information of the sending terminal may be included by using one or more parameters among a header field of the SIP, a body parameter of the header field of the SIP, a tag of the header field of the SIP, a field of the SDP, and an extensible markup language (XML) body.

The session controller **200** transmits the SIP based message received from the gateway **300** to the UE-1 **100** (S**1662**). The UE-1 **100** receiving the SIP based message transmits a response message (for example, SIP 200 OK message) thereto to the session controller **200** (S**1664**). The session controller **200** transmits the response message to the gateway **300** (S**1666**).

Further, the UE-1 **100** transmits a delivery report (for example, Delivery Report) including a response (positive or negative) to the received short message to the session controller **200** (S**1670**). The session controller **200** transmits the delivery report to the gateway **300** (S**1672**).

The gateway **300** transmits a response message (for example, SIP 202 Accepted message) to the delivery report to the session controller **200** (S**1674**). The session controller **200** transmits the received response message to the UE-1 **100** (S**1676**).

Further, the gateway **300** transmits the delivery report to the SMS-GMSC **500** (S**1680**). The SMS-GMSC **500** transmits the delivery report to the SMS-SC **600** (S**1685**).

FIG. **17** is one embodiment of a process of transmitting and receiving a short message according to the specification.

FIG. **17** illustrates an entire process in which a short message sent by an IMS subscribing terminal UE-2 without a mobile communication global unique number is transferred to the IMS subscribing terminal UE-1 without the mobile communication global unique number.

The process illustrated in the embodiment is the same as described in FIGS. **14** and **16**.

The embodiment of the present invention may be applied to not only the IMS subscribing terminal but also an IMS non-subscribing terminal. In this case, as if the IMS subscribing terminal allocates the SMS-ID during the IMS registration, in the case of the terminal, one (for example, node such as SGSN and MME) of nodes participating in an access procedure during network accessing allocates the SMS-ID for the terminal to notify the allocated SMS-ID to the HLR/HSS. In this case, the SMS is not performed through an IMS domain but performed through a PS domain, and a switching method of the short message between UEs belonging to the proposed IMS subscriber may be applied in the same manner.

FIG. **18** is an internal block diagram of a gateway according to an embodiment of the specification. The gateway **300** interworking messages of heterogeneous protocols for the sending terminal may be the IP-SM-GW.

As illustrated in FIG. **18**, the gateway **300** includes a storage unit **301**, a controller **302**, and a transmitting/receiving unit **303**.

The storage unit **301** stores the methods illustrated in FIGS. **9** to **17**.

The controller **302** controls the storage unit **301** and the transmitting/receiving unit **303**. In detail, the controller **302** performs the methods stored in the storage unit **301**, respectively. In addition, the controller **302** transmits the aforementioned signals and/or messages through the transmitting/receiving unit **303**.

The controller **302** may include an application-specific integrated circuit (ASIC), another chip set, a logic circuit and/or a data processing apparatus. The storage unit **301** may include a read-only memory (ROM), a random access memory (RAM), a flash memory, a memory card, a storage medium and/or other storage devices. The transmitting/receiving unit **303** may include a baseband circuit for processing a radio signal. When the embodiment is implemented by software, the aforementioned method may be implemented by a module (process, function, and the like) performing the aforementioned function. The module is stored in the storage unit **301** and may be performed by the controller **302**.

The storage unit **301** may be disposed inside or outside the controller **302**, and be connected with the controller **302** as various well-known means.

The aforementioned embodiments are acquired by combining the components and features of the present invention in a predetermined format. It should be considered that each component or feature is selective if not additionally clearly mentioned. Each component or feature may be implemented while being not combined with other components or features. Further, some components and/or features are combined to configure the embodiment of the present invention. A sequence of the operations described in the embodiments of the present invention may be changed. Some components or features of any embodiment may be included in another embodiment or replaced with corresponding components or features of another embodiment.

The present invention may be implemented in another specific form within the scope without departing from the spirit and essential feature of the present invention. Therefore, the detailed description should not limitatively be analyzed in all aspects and should be exemplarily considered. The scope of the present invention should be determined by rational interpretation of the appended claims and all changes are included in the scope of the present invention within the equivalent scope of the present invention. Further, claims having no clear quoting relation in the claims are combined to configure the embodiment or may be included as new claims by correction after application.

The invention claimed is:

1. A method for processing a message, the method performed by a gateway for interworking messages of heterogeneous protocols for a sending terminal and comprising:

acquiring a temporary identifier of the sending terminal when the sending terminal has subscribed in an IP multimedia subsystem (IMS) without being allocated with a mobile subscriber integrated services digital network number (MSISDN), wherein the temporary identifier of the sending terminal is used for transmitting a short message during an IMS registration valid period of the sending terminal;

receiving, from an IMS based session controller, a session initiation protocol (SIP) based message generated by the sending terminal, wherein the received SIP based message includes an encapsulated short message service (SMS) based message which includes no MSISDN of the sending terminal and a receiving terminal;

acquiring a temporary identifier of the receiving terminal on a basis of an SIP based identifier of the receiving terminal encapsulated in the SIP based message;

regenerating the SMS based message on a basis of the received SIP based message, the temporary identifier of the receiving terminal, and the temporary identifier of the sending terminal; and

transmitting the generated SMS based message to a switcher,

wherein the regenerating of the SMS based message includes:

decapsulating the SMS based message encapsulated in the received SIP based message; and

adding the temporary identifier of the receiving terminal and the temporary identifier of the sending terminal to the decapsulated SMS based message.

2. The method of claim **1**, wherein the acquiring of the temporary identifier of the sending terminal includes, receiving the temporary identifier of the sending terminal which a home subscriber server (HSS) of the sending terminal has allocated during an IMS registration procedure.

3. The method of claim **1**, wherein the acquiring of the temporary identifier of the sending terminal includes, receiving the temporary identifier of the sending terminal which the IMS based session controller has allocated during the IMS registration procedure.

4. The method of claim **1**, wherein the acquiring of the temporary identifier of the sending terminal includes, acquiring the temporary identifier which the gateway has allocated through the IP multimedia subsystem (IMS) registration procedure.

5. The method of claim **1**, wherein the temporary identifier includes a country code (CC) field, a national destination code (NDC) field, and a subscriber number (SN) field, and

the SN field is generated arbitrarily or sequentially or based on an instance ID transmitted which the sending terminal transmits in IMS registration or based on subscriber information of the sending terminal.

6. The method of claim **5**, wherein the NDC field is generated differently for each gateway.

7. The method of claim **1**, wherein the temporary identifier is generated on basis of an international mobile subscriber identity (IMSI) or an integrated circuit card ID (ICCID) of the terminal.

8. The method of claim **1**, wherein the acquiring of the temporary identifier of the receiving terminal includes receiving, by the gateway, the temporary identifier from a home subscriber server (HSS) of the receiving terminal.

9. The method of claim **1**, wherein the acquiring of the temporary identifier of the receiving terminal includes:

acquiring, by the IMS based session controller, the temporary identifier of the receiving terminal from a home subscriber server (HSS) of the receiving terminal; and

acquiring, by the gateway, the temporary identifier of the receiving terminal from the IMS based session controller.

10. A gateway for interworking messages of heterogeneous protocols for a sending terminal, the gateway comprising:

a transceiver configured to transmit/receive a signal to/from the outside; and

a controller connected with the transceiver,

wherein the controller is configured to:

control the transceiver to acquire a temporary identifier of the sending terminal when the sending terminal has subscribed in an IP multimedia subsystem (IMS) without being allocated with a mobile subscriber integrated services digital network number (MSISDN), the temporary identifier of the sending terminal being used for transmitting a short message during an IMS registration valid period of the sending terminal;

control the transceiver to receive a session initiation protocol (SIP) based message generated by the sending terminal from an IMS based session controller, wherein the received SIP based message includes an encapsulated short message service (SMS) based message which includes no MSISDN of the sending terminal and a receiving terminal;

control the transceiver to acquire a temporary identifier of the receiving terminal, on a basis of an SIP based identifier of the receiving terminal encapsulated in the SIP based message;

regenerate the SMS based message on a basis of the received SIP based message, the temporary identifier of the receiving terminal, and the temporary identifier of the sending terminal; and

control the transceiver to transmit the generated SMS based message to a switcher,

wherein, to regenerate the SMS based message, the controller is further configured to:

decapsulate the SMS based message encapsulated in the received SIP based message; and

add the temporary identifier of the receiving terminal and the temporary identifier of the sending terminal to the decapsulated SMS based message to generate the SMS based message.

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